RAILROAD GAZETTE

FRIDAY, JANUARY 18, 1901.

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Contributions

Finishing Rails at Low Temperature.

Pittsburgh, Jan. 8, 1901.

TO THE EDITOR OF THE RAILROAD GAZETTE.

At your request I lately visited the Edgar Thomson Works to see the new arrangements spoken of in your editorial of Dec. 28. They have moved the finishing rolls ahead about 56 ft. and have a cooling bed about 100 ft. long and 8 ft. wide to hold the rails as they come from what is termed the "short rolls."

The rails leave these rolls at a yellow heat (1,900 deg.) and are allowed to remain on this table for about one minute fifteen seconds, until they come to an orange or about a free-scaling heat, somewhere about 1,500 deg., when they are put through the finishing rolls. During the afternoon that I was in the mill they never had more than four or five rails on the table at one time. This seemed to be plenty to allow the mill to be operated steadily and no time was lost waiting for rails to reach the proper temperature before giving the finishing pass. One thing seems certain to me and that is that the rails are finished at a varying heat under the present method. While observing this rolling some of the rails were allowed to remain on the cooling table a little longer than usual owing to the breaking of some machinery on the hot saw bed. Such delays, which must occasionally occur, will always tend to make the finishing heat vary. Their practice of keeping the rails on the cooling bed in such a position as to allow the flange of one rail to be near the head of the following rail is all right, but in many cases the rails were not touching each other. The cooling is hardly fast enough to cause much distortion, but I do think that in many cases the flange will be found to be finished at a little lower temperature than the head.

These rails finish up very clean and smooth, much better than when finished at a higher temperature. While I have had no chance to make a microscopic investigation of the fracture of the different rails the fractures obtained in making the ordinary drop tests show a hardened skin of varying depths which is noticeable to a trained eye. This is evidence that this method of rolling gives a rail with a much harder and better wearing surface than heretofore and I think that further investigation and development along these lines will give a very serviceable rail. The method is thoroughly practicable and will be improved upon.

My statements made regarding temperature in this letter depend upon my judgment of heat colors, and the information I could secure from men about the mill. The Carnegie people evidently took their temperature with a pyrometer.

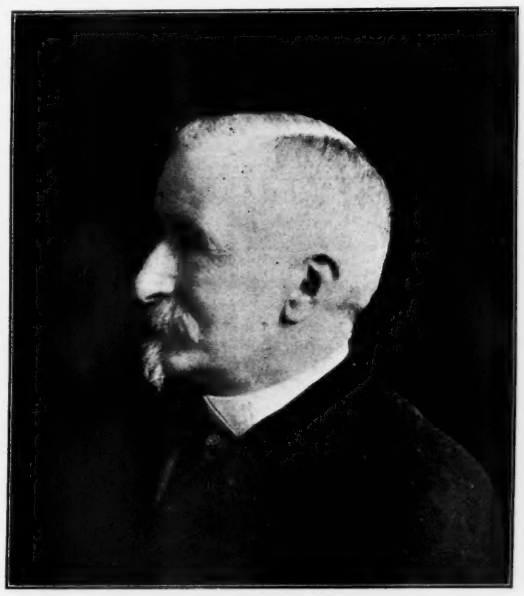
A. B.

Last summer as a train carrying German troops on their way to China was passing over an Italian railroad, it was rescued from imminent danger of a collision by the prompt action of a switchman, at considerable risk to himself. This man has now received the very liberal reward of a pension of 500 francs a year from the German Emperor.

The President of the American Society of Civil Engineers.

Mr. J. James R. Croes, President-elect of the American Society of Civil Engineers, was born on Nov. 25, 1834, in Richmond, Va., where his father, Rev. Robert B. Croes, was rector of St. John's Church. He was named for his two grandfathers, John Croes, born in New Jersey of Holland ancestry, who after serving in the Continental army from 1788 to the close of the Revolutionary war, entered the ministry of the P. E. Church and was, in 1815, elected the first bishop of New Jersey; and James Robertson, a native of Scotland, who came to America at an early age in 1785 and became a well-known banker in Philadelphia and was for several years a member of the Pennsylvania Legislature.

Mr. Croes' boyhood was spent in Freehold, N. J., and Terre Haute, Ind. He graduated at the College of St. James in Maryland in 1853 and then took up the study and practice of civil engineering in New Brunswick, N. J. In 1857 he went to Brooklyn on the construction of the Ridgewood reservoir and engine house of the Brooklyn water works. From 1860 to 1863 he was engaged on the construction of the new Croton reservoir in Central Park, New York City, and the construction of the great 90-in. wrought-iron pipe across High Bridge, the first and largest of its kind in the United States. In 1863-65 he was principal assistant engineer of the Washington (D. C.) aqueduct. In 1865 he assisted Mr. J. P. Kirkwood in investigations for a new water supply for Cincinnati, Ohio, and was then for a short time in charge of harbor improvements in St. Louis, Mo., but was recalled to New York by the Croton Aqueduct Board and for five years was in charge of the construction of the Boyd's Corners Dam. In 1870 he reported on a supply of water for Syracuse, N. Y., from the Tully Lakes. From 1872 to 1879 he was in charge of the development of the street and sewerage system of the 20 square miles of territory recently annexed to New York City north of the Harlem River, now called the Bronx Borough.



J. J. R. Croes.

In the designing of this system the subject of Rapid Transit in large cities was carefully studied by Mr. Croes and the conclusion reached, as set forth in a report to the Park Department by him and Mr. Fred. Law Olmsted, in 1878, that overhead traffic on a separate right of way was preferable to any other system and not more expensive in the long run. Several Rapid Transit Commissions, to which he was engineer in 1879 and 1880, took the same view and one of the railroad companies organized was taken up and, with Mr. Croes as chief engineer, built and operated the Suburban Rapid Transit Railroad, from 129th street and Third avenue, across the Harlem River and up to Tremont, also connecting with the Harlem River Branch of the New Haven Railroad. This is a plate girder structure and where on its own right of way is supported on brick piers. It is designed to carry heavier loads at higher speed than the New York elevated railroads can and one result of this improved construction was that in the blizzard of March, 1888, it was the only railroad within fifty miles of New York on which there was no interruption of traffic. Mr. Croes' connection with the road ceased in July, 1891, when it passed under the control of the Manhattan.

In the discussion of Rapid Transit in New York City Mr. Croes has taken an active part and has contributed to the *Railroad Gazette* a number of analyses and discussions of the daily traffic. For the last twenty years, however, his principal work has been in connection with the water supply and sewerage of cities. In 1879 he made an exhaustive report on sources of water supply for Newark, N. J. In 1887-90 he was retained by the Lehigh Valley Railroad Co. on investigations and negotiations which resulted in the execution of a contract for the supply of water to Newark for ten years, and on the expiration of the contract was called by the city to aid in its adjustment. In 1889 he again reported on water supply for Syracuse, N. Y., and works were built as he recommended. Numerous reports on sewerage and water supply in all parts of the United States have been made by him and many works constructed on his recommendation. In the investigation of failures of ill-constructed works, the valuation of water works and power plants, and the estimation of damages for the taking or diversion of water, his services have been widely called for. In 1888 he was one of a commission of engineers appointed to report on the plans for the great Quaker Bridge Dam of the Croton Aqueduct. In 1891, at the request of the Board of Trade of Johnstown, Pa., he made a report on the condition of the rivers there and the measures needed to prevent the recurrence of disastrous freshets. In 1899 he was engaged by the Comptroller of New York City to examine into the proposed contract for furnishing water to the city by a private company and reported adversely to its advisability, and in 1900 he made a report to the Merchants' Association on the condition and needs of the New York water supply.

Besides numerous contributions to the *Transactions* of the American Society of Civil Engineers and the American Water Works Association, he has published in *Engineering News* historical and descriptive sketches of more than 800 water works in the United States, and for several years was an editorial contributor to the *Sanitary Engineer*. He also wrote a number of articles on hydraulic subjects for Johnson's Universal Cyclopedia.

He has been a member of the American Society of Civil Engineers since 1867, was its Treasurer for ten years and Vice-President in 1888. He is a member of the Institution of Civil Engineers, the American Water Works Association, the New England Water Works Association, the American Public Health Association and the Century and Union League Clubs of New York City.

American Society of Civil Engineers.

The annual meeting of the American Society of Civil Engineers began its sessions at 10 o'clock on Wednesday morning. The ballot for officers for 1901 was canvassed during the morning, and the following gentlemen were elected:

President, J. James R. Croes, New York City.

Vice-Presidents, Henry S. Haines, New York City; George H. Benzenberg, Milwaukee, Wis.

Treasurer, Joseph M. Knap, New York City.

Directors, Josiah A. Briggs, New York City; George F. Swain, Boston, Mass.; Emil Kuichling, Rochester, N. Y.; Mordecai T. Endicott, Washington, D. C.; Edward C. Carter, Chicago, Ill.; Frank C. Osborn, Cleveland, Ohio; William H. Searles, Cleveland, Ohio.

The reports of the Board of Direction, the Secretary and the Treasurer were submitted. The membership in all classes is 2,337—a net increase in the year of 138, the largest in the history of the Society. The losses by death were 25; dropped, 26, and resigned, 8. The Board passed to ballot as Members, 87; as Associate Members, 126; total, 213. The Members elected were 58 and Associate Members, 82; total, 140. A considerable number failed of election, although we are not informed just how many, but the Board says:

> The increase in the number of candidates defeated by ballot leads the Board to the belief that there is not a full understanding as to the care with which all applications are considered, and the weight which is always given to confidential communication in regard to any candidate. It is believed that whenever the use of a negative vote is justifiable, the candidate would not be passed to ballot if all available information were placed in the hands of the Board, and the fact that some of those who are defeated on the first ballot are again passed to a reconsideration ballot, and thereon elected, means either that the case against the applicant is not a good one, or that the Board has not been supplied with information on which a refusal to pass his name to ballot could be based. It is not intended to criticize in any way the exercise of the right of suffrage, but to express the belief that members, generally, do not understand that the most certain and effectual manner in which to prevent the election of an undesirable candidate is to place in the hands of the Board the reasons which would impel them to cast a negative vote. If the monthly Blue Lists were carefully scanned, and each person connected with the Society would feel it his duty to give the Board the benefit of his knowledge of any applicant, it is confidently believed that better results would obtain, and that the special reconsideration ballot would be much less frequent and possibly disappear.

The Board speaks of the index to the library lately issued (of which we have already spoken), and says that the Secretary has been authorized to prepare a general index to the 44 volumes of *Transactions*, which it is hoped will be ready within the next few months.

The cost of publications was $18,185 gross and $13,570 net. A payment of $10,000 was made on the mortgage and a further payment will be made in 1901 of $5,000, reducing the debt to $70,000. The assets of the Society are now $272,883, of which $191,730 is in the house and lot (cost). The Treasurer's balance sheet is:

Balance on hand Dec. 31, 1899			$13,728.36
Receipts from current sources, Jan. 1 to Dec. 31, 1900			51,495.28
Received from sale of Historical Sketch			45.00
Payment on audited vouchers for current business, Jan. 1 to Dec. 31, 1900		$15,338.82	
Payment on principal of bond and mortgage		10,000.00	
Balance on hand Dec. 31, 1900:			
In Union Trust Co.	$4,597.24		
In Garfield National Bank	4,347.58		
In hands of Treasurer	985.00	9,929.82	
		$65,268.64	$65,268.64

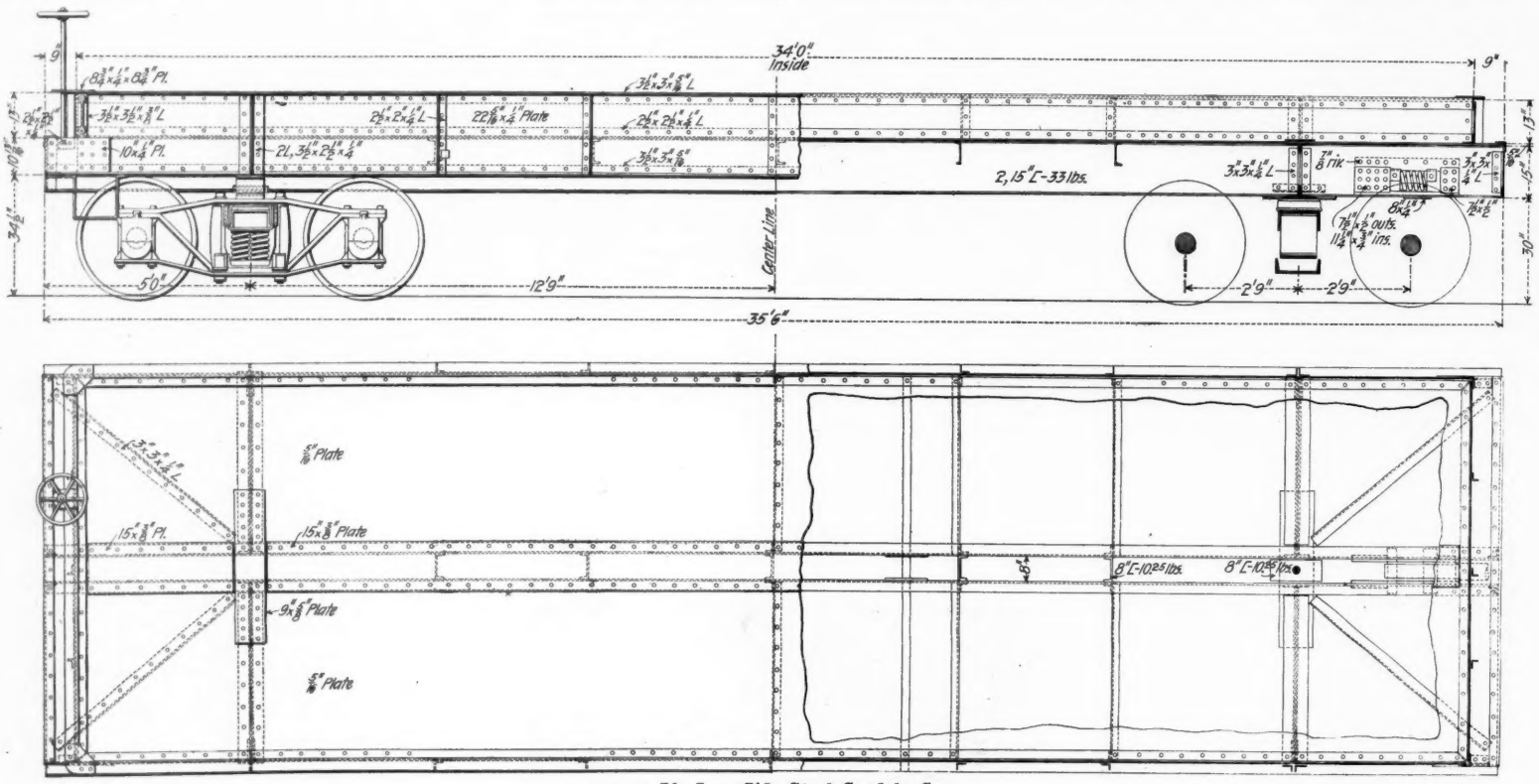
The Norman medal, for the year ending with the

month of July, 1899, was awarded to E. Herbert Stone, M. Am. Soc. C. E., for his paper on "The Determination of Safe Working Stress for Railway Bridges of Wrought Iron and Steel."

The Thomas Fitch Rowland Prize, for the same year, was awarded to R. S. Buck, M. Am. Soc. C. E., for his paper, entitled "The Niagara Railway Arch."

The Collingwood Prize for Juniors, for the same year, was awarded to Julius Kahn, Jun. Am. Soc. C. E. (now Assoc. M. Am. Soc. C. E.), for his paper, entitled "The Coal Hoists of the Calumet and Hecla Mining Company."

The following awards were made for the year ending with June, 1900:



100,000 Lb. Low-Side Steel Gondola Car.

Designed by Mr. L. M. Slack. *Built by the* Cambria Steel Company.

The Norman Medal, to James A. Seddon, M. Am. Soc. C. E., for a paper on "River Hydraulics."

The Rowland Prize, to Allen Hazen, M. Am. Soc. C. E., for a paper on the "Albany Filtration Plant."

The Collingwood Prize, to Robert P. Woods, Jun. M. Am. Soc. C. E. (now Assoc. M.), for a paper on "Street Grades and Cross Sections in Asphalt and Cement."

The following Nominating Committee was elected: Ira A. Shaler, District No. 1; S. E. Tinkham, District No. 2; J. F. Alden, District No. 3; P. L. Wölfel, District No. 4; Onward Bates, District No. 5; R. Montfort, District No. 6, and C. D. Marx, District No. 7.

The Committee on Cement reported progress and was authorized to add to its numbers in its own discretion.

State Ownership of Railroads.

President Hadley contributes to the Century issue of the New York *Evening Post* a review of the development of railroads, chiefly from the economic side. We reprint what he says about state ownership:

"The majority of countries have not been content with limiting by legislation arbitrary action on the part of railroad managers, but have insisted that a power of this kind could properly be placed only in the hands of agents of the Government. In other words, they have committed themselves to a greater or less degree to the principle of state railroad ownership. This was in one sense no new thing. Belgium had from the first had state railroads. Ever since 1850 Prussia had had a very considerable state railroad system, originally undertaken for strategic purposes. But it was not until after the war of 1870 that railroads were taken by governments as a means of strengthening governmental power over the life of the nation. In the decade which succeeded the war of 1870, all the more important Continental countries, with the exception of France, greatly increased the hold which they had upon their railroads. The system of state ownership was already triumphant throughout Australia and powerful in British India.

"In the light of actual experience it is seen that the results of Government ownership in the matter of railroad economy and operation are not greatly different from those of private ownership. There are nearly the same possibilities of good management, and the same evil possibilities of bad management, whichever system is chosen. If we have a little more chance of irregularity under private management, this is balanced by an increased chance of inefficiency under government management. Much is made of comparative statistics by the advocates of one system or the other, but it is generally found on critical examination that these statistics prove far less than seems plausible on their face. The advocate of private ownership points to the fact that the freight rates per ton per mile in the United States are the lowest in the world; but his opponent can show not upon private ownership nor upon state ownership, but upon the average rate of wages per day received by the bulk of the population. If a man has high wages, he can pay money to save time; if he earns relatively low wages, he can sacrifice time to save money. In the former case the railroads will pay their train expenses by carrying relatively small loads at high speed; in the latter, by having few trains which carry large numbers of passengers very slowly.

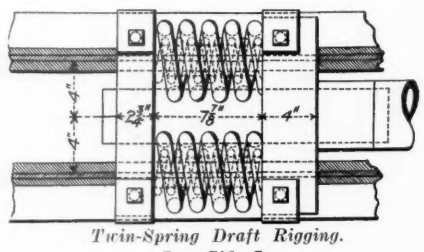
"Instead of arguing on the relative merits of state ownership or private ownership, the students of railroad economy at the present day recognize that the decision of this question depends upon the industrial habits and traditions of different peoples. That system is the better which gives the best chance of securing efficient managers for the railroads, and of holding those managers responsible for using their power in the public interest. When the civil service is good and private business methods slack, there is reason for state ownership. When the civil service is less good and private business methods better, the best results may be expected from ownership and management by private companies."

The L. M. Slack Steel Cars.

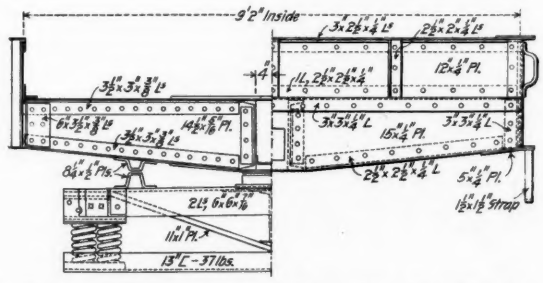
It has been recently announced that the Cambria Steel Company has contracted to build 500 steel gondola cars of 100,000 lbs. capacity for the Philadelphia & Reading, and the same company has about completed two sample high-side gondola cars, two low-side gondola cars, two hopper-bottom coal and ore cars and two coke cars. These cars have many novel and interesting features and the two types of gondola cars are shown by the accompanying engravings. The low-side car is designed especially for carrying rails, structural shapes, pig iron, etc. The high-side car is such as will be built for the Philadelphia & Reading and is intended for a general utility car; being equipped with drop-bottom doors, it is available for coal traffic. In the Reading order, this design will be followed with the single exception that Westinghouse friction draft rigging will be used instead of the triple spring draft rigging shown.

It will be seen that the two gondola cars are built on similar lines, the only notable difference being in the height of the sides and the equipment of one with drop doors. These cars were originally designed by Mr. L. M. Slack, General Manager of the Drexel Railway Supply Co., Chicago, early in 1897, but have been so amended as to keep pace with present day requirements. The designs are based on the idea that as plate girder construction has become the accepted practice for short span bridges, its use with certain modifications should be of equal value in steel car construction. The correctness of this is for the future to determine, but there is good reason to believe that practice will show the construction to be a good one. The material used in these cars is confined to rolled shapes of stock sizes such as may be got from any of a dozen makers in this country. The advantage of this feature is apparent, contributing to economy in maintenance, as well as bringing repairs within the facilities of the ordinary railroad shop. Pressed and bent shapes, other than simple right angle bends, have been eliminated and distortion of material or undue strains have been carefully avoided. One of the salient features of the car is the omission of side sills, the plate girder construction making them unnecessary. Their duty is performed by the sides which not only confine the load, but carry their due proportion of it. A very stiff backbone is provided in the center sills, which are two 15-in. channels, 33 lbs. per ft. These may be run unbroken the entire length of car, but as an alternate construction they may be spliced at a point just forward of the body bolster; this will admit of repairs being more easily made in event of damage to the ends of the car.

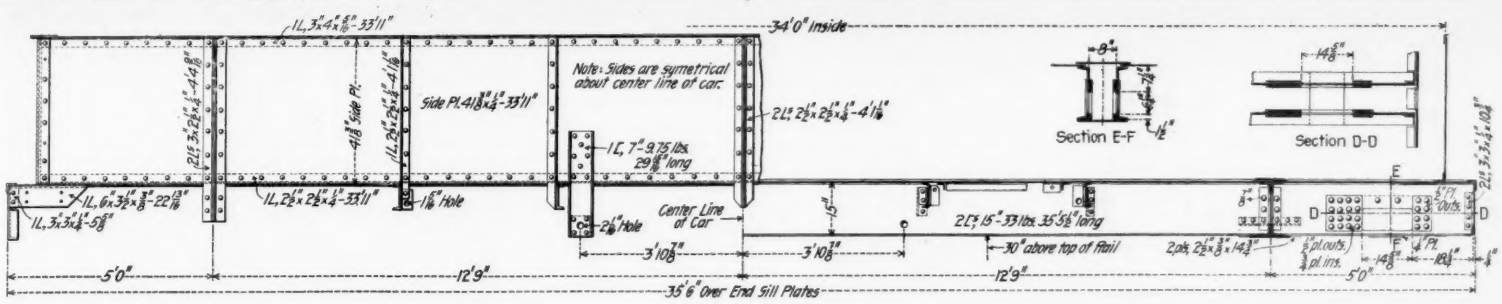
High-Side Gondola.—The length inside is 34 ft., the width 9 ft. 2 in., and the sides are 42 in. high. The center sills, as shown, are 15-in. steel channels extending the full length of the car. The sides are simply girders with ¼ x 41⅜-in. web plates which are continuous for the full length of the side, 33 ft. 11 in., or if desired they may be divided at the center and spliced. The upper flange of this girder is a 3 x 4 x 5-16-in. angle, and at the bottom the sides are riveted to the floor plates through 2½ x 2½ x ¼-in. base angles. The stiffeners are vertical angles which also correspond to the side stakes of wooden cars; they extend below the floor and are riveted to the ends of the intermediate cross channels. The arrangement of the floor plates is

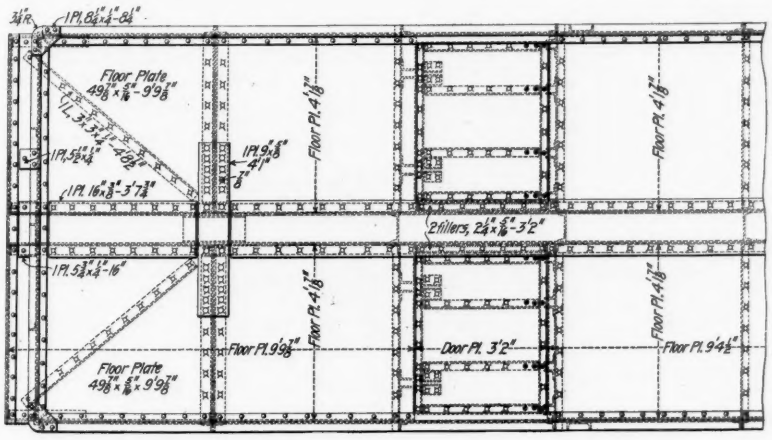


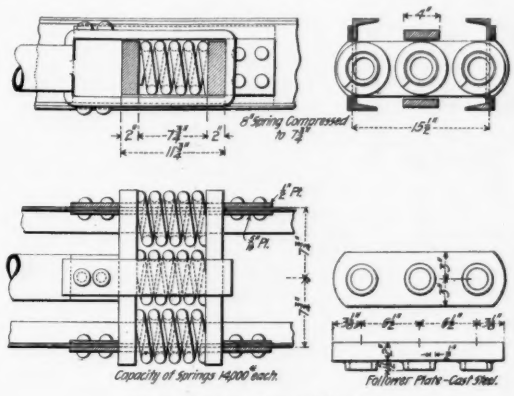
Twin-Spring Draft Rigging.
Low Side Car.



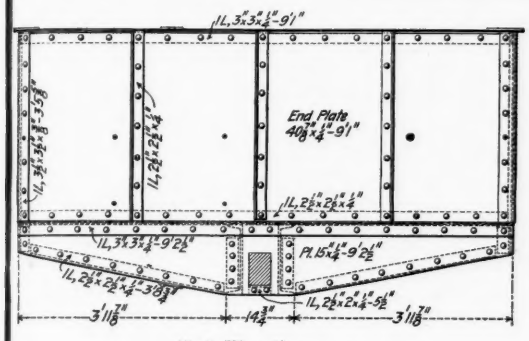
Half Section at the Body Bolster. Half End Elevation.
Low Side Car.


34'0" Inside
Note: Sides are symmetrical about center line of car.
Section E-F
Section D-D
Center Line of Car
30" above top of rail
35'6" Over End Sill Plates

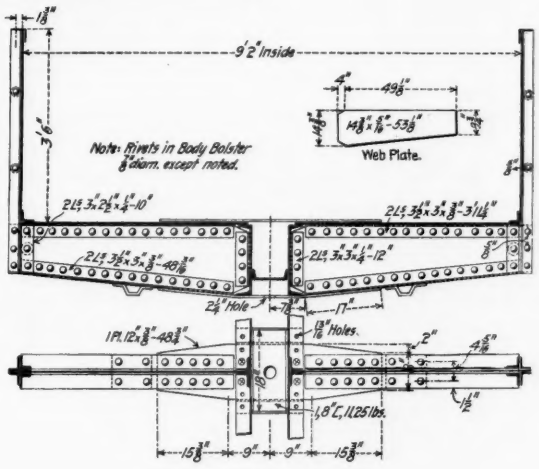




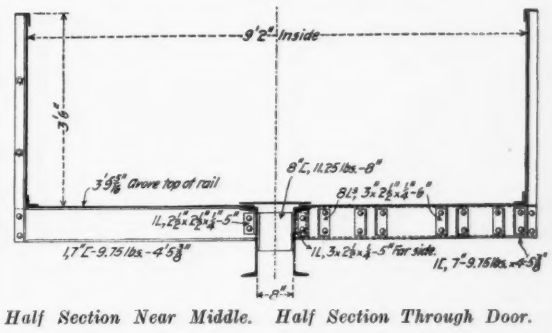
Triple-Spring Draft Rigging.



End Elevation.



Detail of Body Bolster.



Half Section Near Middle. Half Section Through Door.

Designed by MR. L. M. SLACK. *Built by the* CAMBRIA STEEL COMPANY.

100,000 Lb. High-Side Steel Gondola Car.

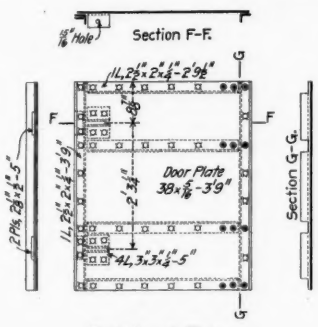
shown by the cross-sectional views. A 5-16-in. plate extends from the base of the side plate to the inner edge of the flange of the nearest center sill, and a narrow ⅜-in. plate along the center overlaps these edges so that the center lines of rivets engage both plates and the upper flanges of the sills. This longitudinal center plate is caulked along its lower edge to keep out moisture and the floor rivets are countersunk, thus facilitating unloading with shovels.

Suitable openings are made in the floor for drainage. Four drop doors, 38 x 45 in., are provided in the floor and are operated by a system of levers and shafts. The supports for the edge of the door are cast steel pivoted latches placed underneath, and connected with longitudinal shafts to which are attached weights. These last operate latches by gravity.

The construction of the body bolster is shown. Between each center sill and side is a 5-16-in. vertical web plate with flange angles above and below. The top flanges of the bolster are riveted to the floor plates and to an upper ⅝-in. cover plate. Angles connect each web plate to the center sills and at the ends the bolsters are joined to the sides of the car through two heavy vertical angles. The bottom cover plate is ⅝ in. The center plates are malleable iron, arranged for lubrication by the Dayton Malleable Iron Co.'s method.

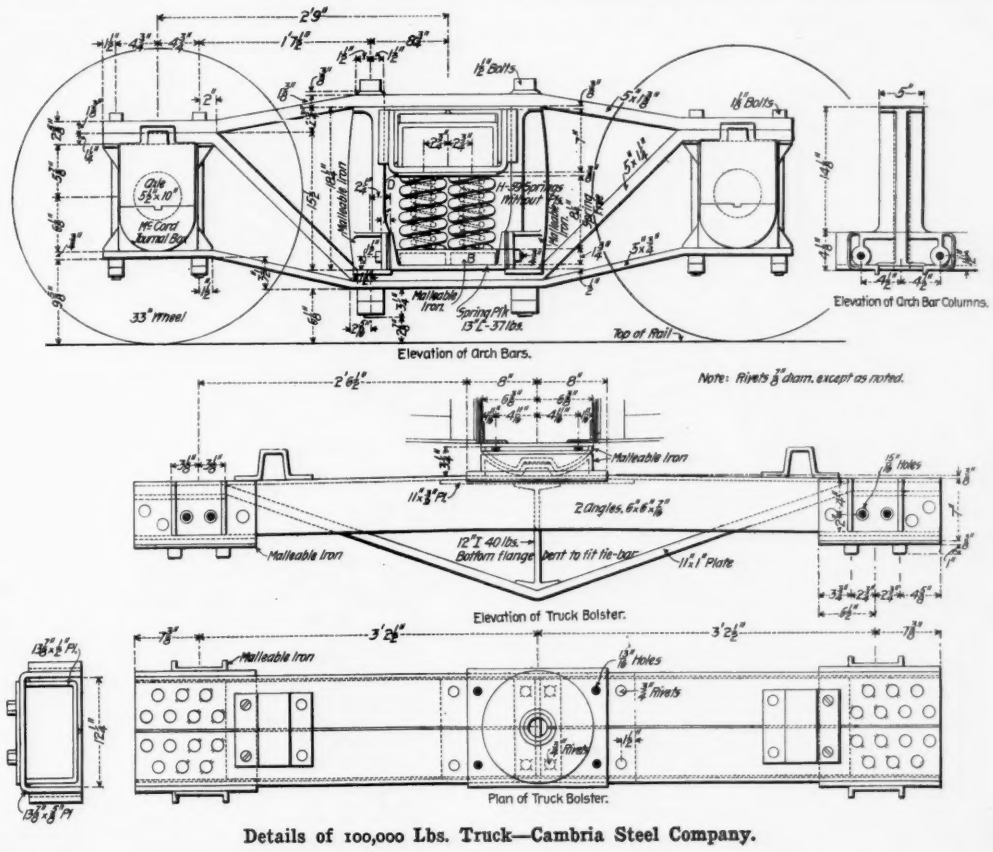
The arrangement of the draft rigging is shown in detail. Three coil springs are used side by side, each having a capacity for 14,000 lbs., making the total spring capacity about 42,000 lbs. The center sills are slotted to take the followers and outer springs, the center lines of the outer springs being placed in line with the webs of the sills. The reinforced sides of this opening form the follower stops. The follower plates are steel castings and the ordinary coupler yoke is used.

Low-Side Gondola.—The general features of this car are much like those of the high-side gondola. It is of 100,000 lbs. capacity and is intended for loads of rails, pig iron and other heavy materials. The inside dimensions are 34 ft. long by 9 ft. 2 in. wide. As the sides are but 13 in. high, the side girders are extended below the floor line, the web plates being ¼ x 22 5-16 in. The center sills are 15-in. channels, the body bolster construction is the same as described before, and the cross-intermediate channels in this car are joined by angles to the web of the side girders. Drop doors may be applied, although not shown in the drawings. Double spring draft rigging is used, having a total spring ca-



Details of Door.

High-Side Car.


Elevation of Arch Bars.
Elevation of Arch Bar Columns.
Elevation of Truck Bolster.
Plan of Truck Bolster.
Malleable Iron
Note: Rivets 7/8" diam. except as noted.

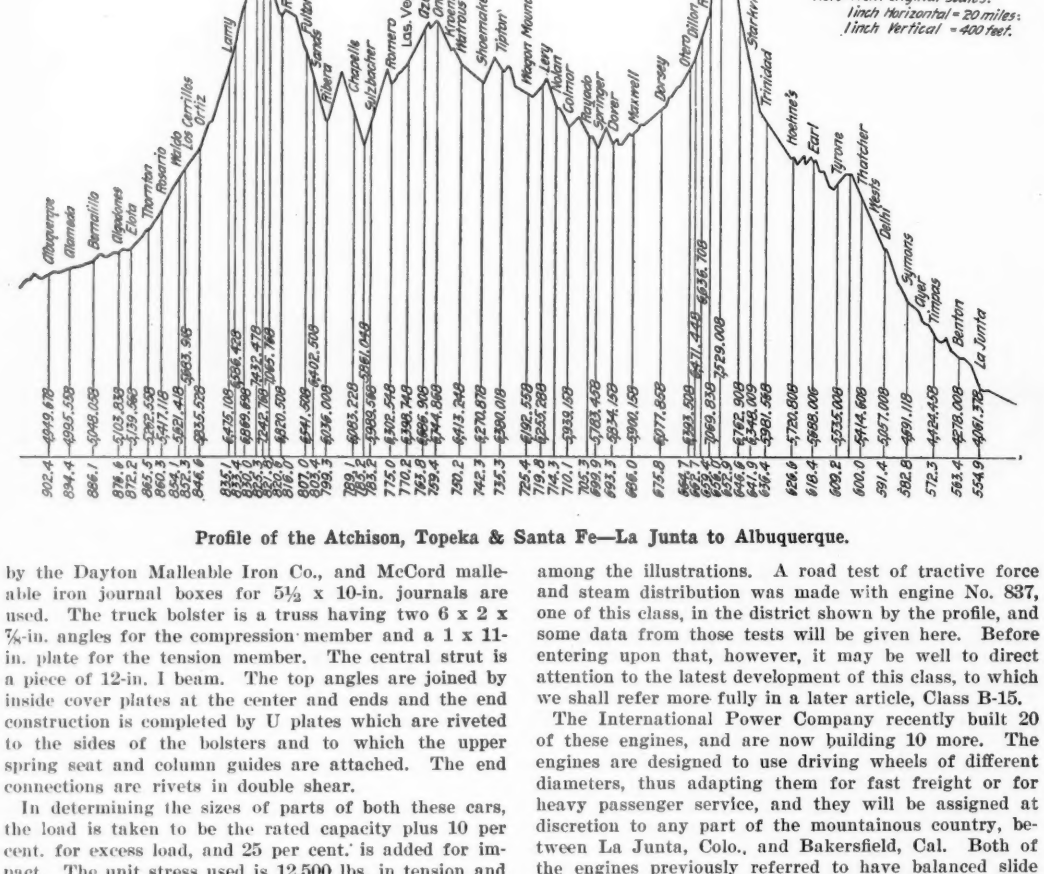
Details of 100,000 Lbs. Truck—Cambria Steel Company.

pacity of about 38,000 lbs. The center sills are slotted and reinforced and the springs are placed directly in line with the webs of the sills.

Truck.—The truck is of the diamond frame type, 100,000 lbs. capacity, with a bolster built up of structural shapes. The upper arch bar is 1⅜ x 5 in., the lower arch bar 1¼ x 5 in. and the tie bar is ¾ x 5 in. The columns are malleable iron of special design, furnished by the Dayton Malleable Iron Co., and McCord malleable iron journal boxes for 5½ x 10-in. journals are used. The truck bolster is a truss having two 6 x 2 x ⅞-in. angles for the compression member and a 1 x 11-in. plate for the tension member. The central strut is a piece of 12-in. I beam. The top angles are joined by inside cover plates at the center and ends and the end construction is completed by U plates which are riveted to the sides of the bolsters and to which the upper spring seat and column guides are attached. The end connections are rivets in double shear.

In determining the sizes of parts of both these cars, the load is taken to be the rated capacity plus 10 per cent. for excess load, and 25 per cent. is added for impact. The unit stress used is 12,500 lbs. in tension and 8,500 lbs. in compression. It is believed that these assumptions result in a larger factor of safety than is common to steel cars. The estimated weights of the cars are 32,000 lbs. for the high-side and 30,000 lbs. for low-side gondolas. These figures compare favorably with the weights of similar capacity cars built up to this time and would seem to disprove the claim that cars built exclusively of rolled shapes must necessarily be unduly heavy.

The special features of the various types of cars such as the plate girder construction, draft rigging, drop doors and body and truck bolsters are covered by patents, with other claims pending. It may be seen that the truck bolster shown is applicable to any arch bar truck, and steps will be taken soon to place it on the market independent of the steel cars.



Profile of the Atchison, Topeka & Santa Fe—La Junta to Albuquerque.

among the illustrations. A road test of tractive force and steam distribution was made with engine No. 837, one of this class, in the district shown by the profile, and some data from those tests will be given here. Before entering upon that, however, it may be well to direct attention to the latest development of this class, to which we shall refer more fully in a later article, Class B-15.

The International Power Company recently built 20 of these engines, and are now building 10 more. The engines are designed to use driving wheels of different diameters, thus adapting them for fast freight or for heavy passenger service, and they will be assigned at discretion to any part of the mountainous country, between La Junta, Colo., and Bakersfield, Cal. Both of the engines previously referred to have balanced slide valves. The Class B-15 has piston valves with inside admission. The cylinders are 20 in. x 28 in.; weight on driving wheels is 125,930 lbs.; on the engine truck, 36,270 lbs.; total weight of engine, 162,200 lbs.; total heating surface, 2,329 sq. ft.; grate area, 29.8 sq. ft.; working steam pressure, 200 lbs., and driving wheels, 67 in. diameter.

It is noticeable that these grate areas are moderate, and that the proportion of grate area to heating surface is, on an average, nearly as 1 is to 80, the several ratios being as follows, in the order in which the engines are mentioned: as 1 to 87.8; as 1 to 75; and as 1 to 78. Throughout the district shown by the profile soft coal that compares favorably with Pennsylvania Clearfield coal is used. Tested under stationary boilers this coal has an ash refuse of from 16 to 17 lbs. per hundred, and is a moderate flame coal. The overland passenger trains consist of from 6 to 10 cars, an average train of 8 cars usually weighing close to 300 tons, and the schedules

Summary of Grades and Curves—La Junta to Albuquerque.

From	Max. Grades, Ft. per Mile.		Sum of Ascents, Ft.		Curvature.	
	West.	East.	West.	East.	Maximum.	Total.
La Junta to Trinidad..	59.7	31.7	2363.81	443.62	7 deg., 30 min.	1587 deg., 3 min.
Trinidad to Raton....	184.8	175.3	1643.64	988.56	10 deg.	2729 deg., 28 min.
Raton to Las Vegas	69.7	70.7	2074.05	2312.01	6 deg., 10 min.	2719 deg., 13 min.
L. Vegas to Thornton	89.8	158.4	2248.80	3384.99	10 deg.	7389 deg., 40 min
Th'rnt'n to Alb'q'rq'e	21.1	26.4	110.46	223.34	8 deg., 20 min.	7381 deg., 45 min.

and work try the total range of working cut-offs of the engines. The speed is sometimes as low as 15 miles an hour and at more favorable points, as great as it is desirable to run. A good idea of the average duty may be had from weights and speeds shown in the accompanying table of data for indicator diagrams. The fuel records of these engines, to which we have had access by the courtesy of Mr. John Player, Superintendent of Machinery, show that the work is being done very economically. As there is much of the Santa Fe track in level country feeding the trunk lines, there must be, for years to come, a field where this class of engine can be used to good advantage, and the policy of exhausting the possibilities of this type on the mountains and later withdrawing it to the lowlands is a good one.

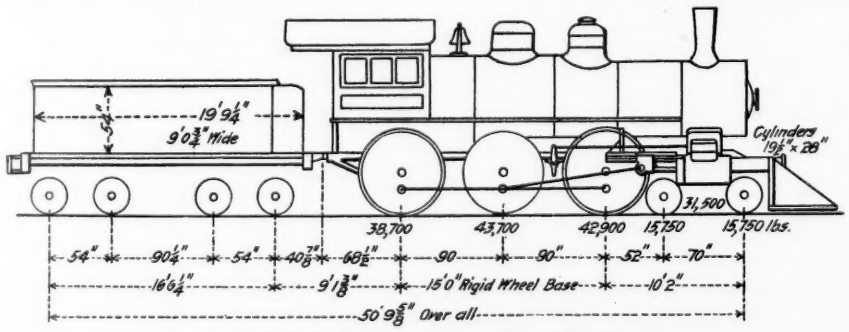
Engine No. 837, of which an engraving is here shown, was tested in September, 1899. The valves, when the accompanying indicator cards were taken, had 1 in. outside lap; were line and line inside; set line and line in full gear; and had the Allen supplementary port. The lead at 6-in. cut-off with this setting was 5-16 in. At

Some Ten-Wheel Passenger Locomotives—Atchison, Topeka & Santa Fe.

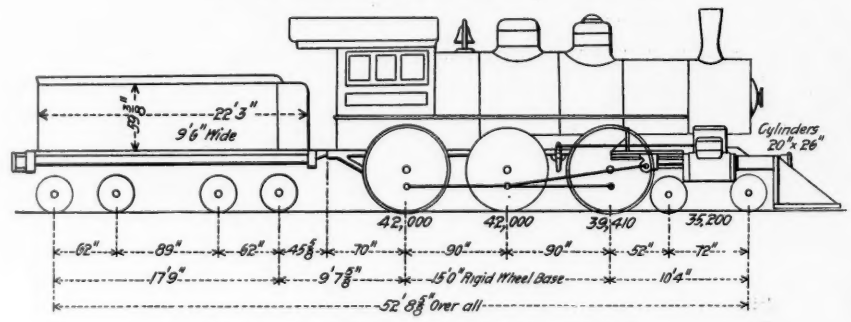
The tractive force of locomotives used on heavy-grade divisions of the Atchison, Topeka & Santa Fe has for several years been systematically increased to meet the growing demand for power, and the engines supplanted on the mountains have been brought down into the comparatively level country, thus strengthening the entire system in accord with a carefully considered policy. Among passenger engines, the three types of engine that have led the van in this movement have been listed under the general head of Class B, and their development is shown in three diagrams herewith. There will presently be a re-numbering and re-classification of engines of the entire system, based upon tractive power and number of wheels.

Class B-13, of which eight were built by the Dickson Locomotive Works about four years ago, have cylinders 19½ x 28 in.; 125,300 lbs. on driving wheels; 31,500 lbs. on the engine truck; total weight of engine, 156,800 lbs.; total heating surface, 2,196 sq. ft.; grate area, 25 sq. ft.; working steam pressure, 180 lbs., and driving wheels 73 in. diameter. These engines did much of the fast and heavy passenger work between La Junta, Colo., and Las Vegas, N. Mex., for about two years, and during part of that time one of them did good work between La Junta and Denver, where, in the neighborhood of Palmer Lake, the duty is particularly heavy, and they were also used to good advantage in less trying places. Eventually, they were withdrawn to the Western Division, between Dodge City and La Junta, and Class B-14 was put on the mountains between La Junta and Albuquerque.

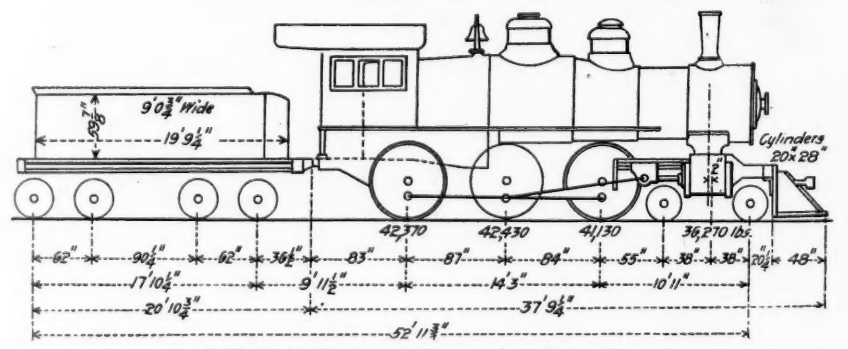
Ten of the Class B-14 engines were built at the Baldwin Locomotive Works. They have cylinders 20 in. x



A. T. & S. F. Passenger Locomotive—Class B-13.



A. T. & S. F. Passenger Locomotive—Class B-14.



A. T. & S. F. Passenger Locomotive—Class B-15.

one station in the mountains a stop had to be made with from six to eight cars, on a curve of nine degrees and a grade of something more than 1 per cent. At one time a lead of 1-32 in. was tried on this engine with particular reference to making the start at the point named. As expected, it gave a perfect demonstration of the ill effects of lead where the maximum tractive effort is required in full gear, before there is enough momentum to turn the exhausting engine past the dead center. With this engine, as with any other under like conditions, the result was that the slack of the train would be drawn out while the left side engine went toward the top quarter, for example, and the right side engine, going to full stroke on the forward center, met its lead volume of steam and was opposed by an equal force to that driving the left side piston ahead. Under such conditions it is hardly necessary to say that the locomotive will be brought to a standstill before making a turn of the wheel. The point is mentioned simply to make it a matter of record in actual work just as it was purposely recorded, by the direction of Mr. Player, for future reference in such discussion on this road.

Among the cards here shown, Nos. 1 and 2 are of interest, being taken as nearly as possible at the moment of making heavy starts. The number of revolutions, and, therefore, the indicated horse-power, of these cards are marked with interrogation as the register of revolutions per minute is well-nigh impossible to get at the first turn of the wheels. These factors are therefore approximated as closely as possible for the two cards, the tractive force being the important feature sought. Card No. 1 is from the head end only. Card No. 2 shows both head and crank ends, and it is apparent from the back-pressure lines that the acceleration was rapid in the short time occupied in taking the cards. Card No. 5 is noticeable because of its very good admission and steam lines, and as showing the effective work of the Allen port at short cut-offs. As showing further these possibilities, even when an engine having relatively small driving wheels is run at high speed, cards 7 and 8 are of interest. Card No. 7 was taken at 81 miles an hour with a 6-in. cut-off and ⅛ in. lift of throttle, at 170 lbs. steam pressure, the number of revolutions per minute being 396. As a matter of passing interest it may be said that this card, and many more, were taken by electric light that was obtained in the cylinder-house by tapping the wires of a Pyle National electric headlight with which the engine is equipped. Card No. 8 is also a very high-speed card for this engine, the throttle lift being 1-16 in., the cut-off 4 in., boiler pressure 173 lbs., revolutions 420 a minute, and speed 86 miles an hour. The drifting cards Nos. 9 and 10 bear their own explanation when read in connection with the table of data.

The greatest tractive force shown by the test was that of Card No. 1, 25,770 lbs. The greatest horse-power recorded was 1,156, card not shown, and the second greatest was 1,038, calculated from Card No. 4. The general specifications are as follows:

GENERAL SPECIFICATIONS.

Description.

Type	Ten-wheel
Name or number	837
Name of builder	Baldwin Locomotive Works
Name of operating road	A., T. & S. F.
Gage	4 ft. 8½ in.
Simple or compound	Simple
Kind of fuel to be used	Soft coal
Weight on drivers	123,410 lbs.
" " truck wheels	35,200 lbs.
" total	158,610 lbs.
" tender loaded	98,000 lbs.

General Dimensions.

Wheel base, total, of engine	25 ft. 4 in.
" " driving	15 ft. 0 in.
" " total (engine and tender)	52 ft. 8⅝ in.
Length over all, engine	37 ft. 3½ in.
" " " total, engine and tender	61 ft. 6⅛ in.
Height, center of boiler above rails	8 ft. 2 in.
" of stack above rails	14 ft. 8¾ in.
Heating surface, fire-box	165.9 sq. ft.
" " tubes	1,982 sq. ft.
" " total	2,148 sq. ft.
Grate area	28.6 sq. ft.

DATA FROM INDICATOR CARDS.

Card Number.	Date.	Train Number.	Number of Cars.	Tons per Train.	Boiler Pressure.	Throttle.	Cut-Off.	Revolutions per Minute.	Speed, Miles per Hour.	Average M. E. P.	Engine I. H. P.	Indicated Traction, Lbs.	Card Taken.
						Ins.	Ins.						
1.....	West. 9-28-99	17	7	247	175	¾	22½	9 (?)	1.9	171	123 (?)	25,770	Start at Glorieta Station.
2.....	West. 9-27-99	17	7	247	175	1	22½	9 (?)	1.9	167	120 (?)	25,167	Start at Glorieta Station.
3.....	East. 9-14-99	2	8	281	180	5/16	13½	60	12	132.5	636	19,979	100 Yards West of Hillside.
4.....	West. 9-27-99	17	7	247	168	¾	11½	108	22	120	1038	18,084	½ Mile West of Fox.
5.....	West. 9-26-99	1	6	213	182	½	7½	60	12	95	457	14,317	2 Miles West of Fulton.
.....	East. 9-26-99	2	8	281	172	½	6	180	37	63	908	9,494	2 Miles East of Alameda.
7.....	West. 9-27-99	17	7	247	170	⅛	6	396	81	28	888	4,220	2 Miles West of Alameda.
8.....	West. 9-5-99	17	7	247	173	1/16	4	420	86	11.5	386	1,733	2 Miles East of Wagon Mound.
9.....	East. 9 14-99	2	8	281	..	..	17½	192	39	..	..	.. .	2 Miles West of Trinidad.
10.....	East. 9-14-99	2	8	281	..	..	17½	186	38	..	..	....	1 Mile East of Starkville.

Cylinders: 20 x 26 in.; wheels, 69 in.; nozzle tip, 5 in.
Valves: 1 in. O. S. lap; line and line inside.
Set line and line, O. S. in full gear.
Have Allen Supplementary Port.
Lead at 6-in. cut off 5-16 in.

Wheels and Journals.

Drivers, number	Six
" diameter	69 in.
" material of centers	Cast steel
Truck wheels, diameter	31¼ in.
Journals, driving axle, size	9 in. x 10 in.
" truck " "	5½ in. x 10 in.
Main crank pin, size	6 in. x 6 in.

Cylinders.

Cylinders, diameter	20 in.
Piston stroke	26 in.
" rod, diameter	3¾ in.
Kind of piston rod packing	Jerome
Main rod, length center to center	10 ft. 2¾ in.
Steam ports, length	18 in.
" " width	1⅝ in.
Exhaust ports, length	18 in.
" " width	3 in.
Bridge, width	1⅜ in.

Valves.

Valves, kind of	Allen Richardson
" greatest travel	5¾ in.
" outside lap	1 in.
" inside lap or clearance	0 in.
" lead in full gear	0 in.

Baldwin Ten-Wheel Passenger Locomotive—Atchison, Topeka & Santa Fe.

Boiler.

Boiler, type of	Extended wagon top
" working steam pressure	180 lbs.
" material in barrel	Steel
" thickness of material in barrel	9-16 in. and ⅝ in.
" diameter of barrel	60 in.
Seams, kind of horizontal	Butt jointed, six row riveted
" " circumferential	Double riveted
Thickness of tube sheets	Front ½ in., back 9-16 in.
" crown sheet	½ in.
Crown sheet stayed with	Crown bars
Dome, diameter	30 in.

Fire-Box.

Fire-box, length	8 ft. 6 in.
" width	3 ft. 4¼ in.
" depth front	72 in.
" depth back	61 in.
" material	Steel
" thickness of sheets	Side and back ⅝ in.
" brick arch?	Yes
" water space, width,	Front, 4 in.; sides, 4 in.; back, 4 in.
Grate, kind of	Rocking and drop

Tubes.

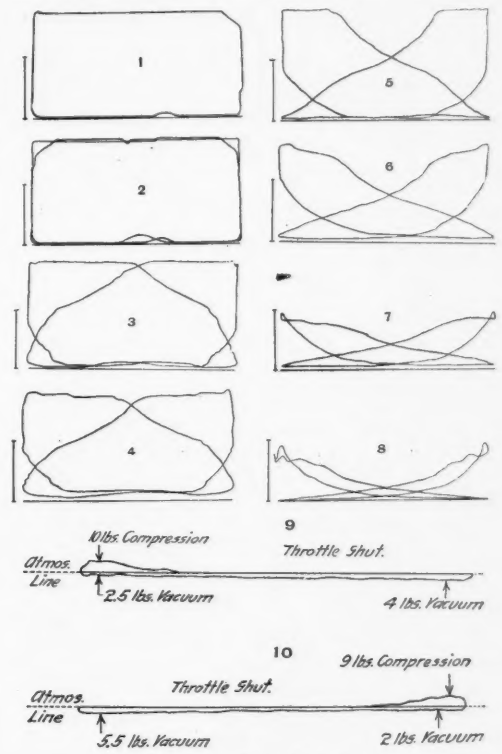
Tubes, number	262
" material	Iron, No 11, W. G.
" outside diameter	2 in.
" length over sheets	14 ft. 3 in.

Smoke-Box.

Smoke-box, diameter	63 in.
" length	61 in.

Other Parts.

Exhaust nozzle, single or double	Single
" " variable or permanent	Permanent
" " diameter	5 in.
" " distance of tip above center of boiler,	1 7-16 in.
Netting	Wire
" size of mesh or perforation,	2 x 2, No. 8, W. G.
Stack, straight or taper	Cast iron taper
" least diameter	15¾ in.
" greatest diameter	18⅝ in.
" height above smoke-box	3 ft. 11 in.



Diagrams From Eng. 837.
Original Scale 1 in. = 100 lbs. See the Vertical Lines.

Tender.

Type	Eight-wheel
Tank capacity for water	5,000 gallons
Coal capacity	8 tons
Kind of material in tank	Steel
Thickness of tank sheets,	Side plates, ¼ in.; top and bottom, 5-16 in.
Type of under-frame, wood or iron	Iron
Type of truck	Arch bar
Truck with swinging motion or rigid bolster	Rigid
Type of truck spring	Elliptic
Diameter of truck wheels	34¼ in.
Diameter and length of axle journals	5 in. x 9 in.
Distance between centers of journals	5 ft. 2 in.
Diameter of wheel fit on axle	6⅜ in.
Diameter of center of axle	5⅜ in.
Type of bolster	Player, cast steel
Type of truck transom	Player, cast steel
Length of tender frame over bumpers	21 ft. 4½ in.
Length of tank	19 ft. 9¼ in.
Width of tank	9 ft. 3 in.
Height of tank, not including collar	4 ft. 11⅞ in.
Height of tank over collar	5 ft. 4 in.
Type of back drawhead	Trojan
With or without water scoop	Without

A New Method of Rating and Loading Engines in Freight Service.*

BY THOS. TAIT, *Manager, Canadian Pacific Ry.* (*Line East.*)

The Canadian Pacific put in effect on Oct. 1st last a new method of rating and loading engines in freight train service. This company was one of the first to adopt the tonnage basis for rating and loading its engines—using actual tons, except in the case of empty freight cars, to the weight of which an arbitrary addition was made—but experience of this, what may be called actual tonnage system, especially in connection with the larger capacity car and the resulting greater variation in the weight of contents, and consequently in the proportion of tare of cars, demonstrated:

First—That the haulage capacity of engines from station to station in each direction should be based on a uniform proportion of tare weight to gross weight behind the tender.

Second—That in loading engines the resistance of every train, as compared with that of a train having this uniform proportion of tare, should be determined.

After investigation it was decided to adopt one-third (two tons of contents to one ton of tare weight), as the uniform proportion of tare weight to gross weight behind the tender to be used in the new schedules of haulage capacity in freight train service. These schedules of haulage capacity of locomotives in freight train service show the number of tons which each class of engine can take from station to station in each direction in a train, the tare weight of which is one-third the gross weight behind the tender. Table 1 gives the figures for the Havelock section.

The engines are classified according to their haulage capacity, each class being designated by its percentage

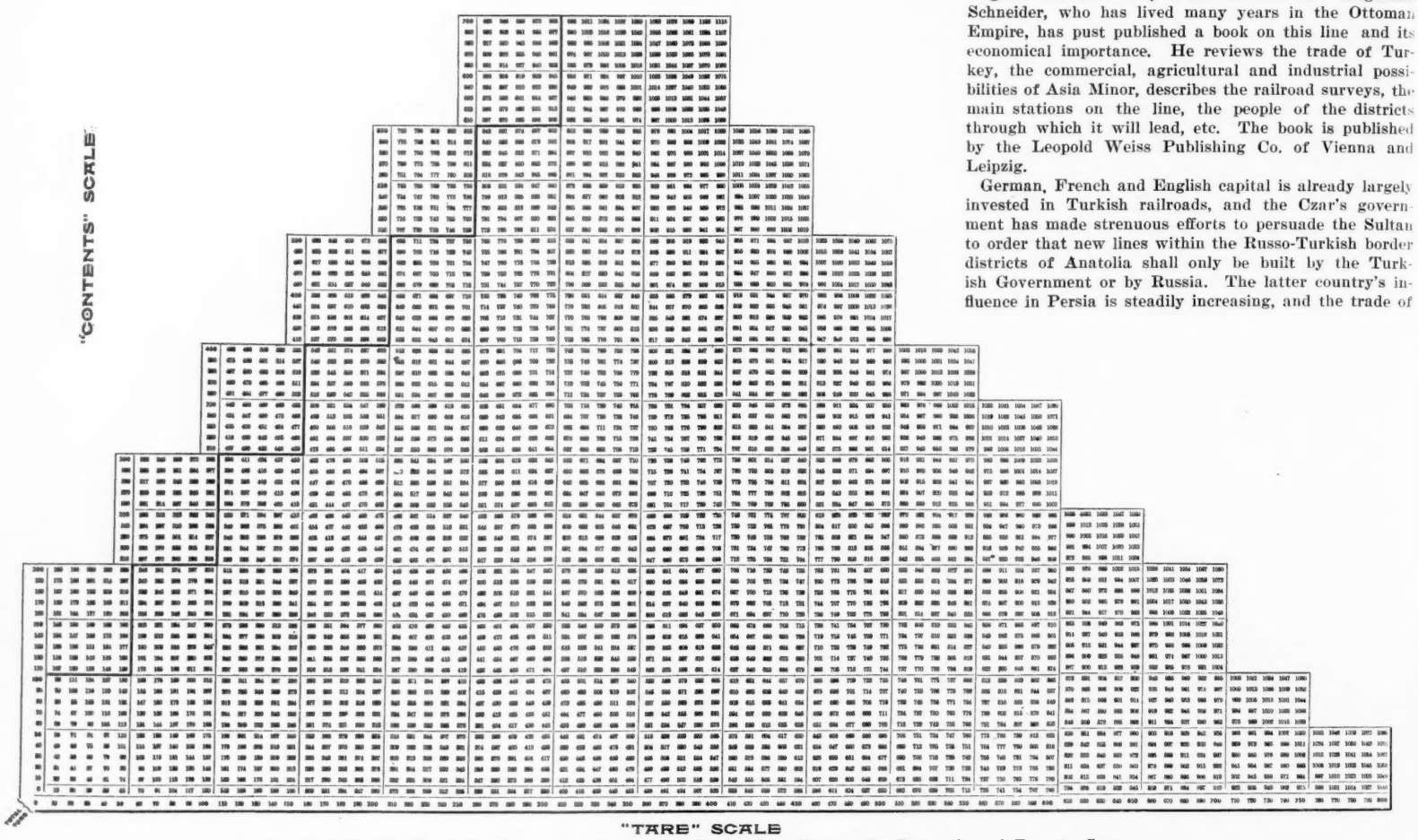
*A paper presented at the meeting of the New York Railroad Club, January 17.

of haulage capacity—the standard ten-wheel freight engines being termed "100 per cent." engines; more powerful engines, "140 per cent.," "150 per cent.," etc.; lighter engines, "60 per cent.," "65 per cent.," etc. Five per cent. of haulage capacity represents approximately a drawbar pull of 1,000 lbs. at seven miles per hour, which is the speed over grade summits on which the haulage capacity of engines has been based. The drawbar pull which any engine can exert is thus easily ascertained if its percentage of haulage capacity is known, or vice versa. In these schedules the ruling grade on each section is clearly indicated, as is also the increased tonnage (passing load), if any, which can be taken if the train does not stop at a station (see figures in italics, Table 1).

A dynamometer car was used to determine the relative haulage capacity of the different classes of engines, and the grade and curve resistance from station to station in each direction; the tonnage in the schedule being weight behind the tender, and by the use of the "equivalent" ton mileage more fair comparisons of fuel and other performance of engines and men can be made than with the actual ton mileage.

The main benefit, however, derived from this system of rating and loading engines is that advantage is taken of every opportunity arising out of the use of larger capacity cars, fully or well loaded (small proportion of tare), to increase the tonnage of freight trains. As the conditions change, owing to the continued increase in the average capacity of cars, it may become advisable to use a different basis in the compilation of these schedules of haulage capacity of engines and of the chart for calculating the resistance of trains.

The full loading of engines in the direction of the balance of tonnage is closely supervised. Superintendents are debited with the equivalent tonnage their engines should take over the ruling grade on each section, and are credited with what they do take. They are only equivalent tonnage taken over the ruling grade on each section to total of loads which, according to schedule and class of rating, should have been taken over that ruling grade by the power on that day is calculated, and the percentage performance on the different sections tabulated for comparison. If an engine doubles or is assisted over the ruling grade the Superintendent is debited with what the engine can take over the next heaviest grade.



Canadian Pacific Chart for Calculating Locomotive Loads According to the Proportion of Tare to Gross.

NOTE.—*The use of this chart is explained in the text. It is here reproduced in less than half-size, merely to show its form.*

the results in many cases not of one or two, but of many tests with this car.

These schedules are accompanied by a Chart (suggested by a graphic chart prepared by Mr. McHenry, of the Northern Pacific), to be used by those whose duty it is to make up trains, for the purpose of calculating the resistance of each train (having regard to the proportion of tare), so that the proper load for the engine may be determined. This chart has been compiled on the basis that empty cars require 30 per cent. more power to haul them than the same tonnage in loaded cars, the "contents" of which weigh twice as much as the tare. It takes the form of a pyramid—the tare tons or scale being shown along the base, and the contents tons or scale up the side, and the operation of finding by it the resistance of any given number of cars, loaded or empty, or both (having regard to the proportion of tare), is quite simple, the figures where the contents and tare tonnage lines meet on the chart being the resistance or equivalent tonnage of the train. For instance, if it is desired to make up a train for an engine scheduled to haul 900 tons over the ruling grade on the section, the tare and contents of sufficient cars to equal together about 900 tons are ascertained. It is found that the tare is 400 tons and the contents 500 tons; opposite 400 on the scale of tare tonnage at the base of the pyramid, and opposite 500 on the scale of contents tonnage on the side is found 945—45 tons too much load for the engine, due to the large proportion of tare. If, however, the tare had been found to be 300 tons and the contents 600 tons, or the tare 410 and the contents 430 tons, in the same way, the figures where the tare and contents tonnage meet are found in both cases to be 900—exactly the right load for the engine—the actual tonnage in the latter case being 60 tons less than in the former case owing to the larger proportion of tare.

The resistance, in tons, of a train, as shown by this chart, is termed the "equivalent tonnage," and the actual weight of the train behind the tender the "actual tonnage." By this method of rating and loading engines every engine is given its approximately correct load—having regard to the proportion of tare weight to gross charged 90 per cent. ("B" rating) of full schedule load on fast freight trains, such as provision, stock and competitive merchandise trains; 93 per cent. ("C" rating) on ordinary freight and 88 per cent. ("D" rating) on fast freight trains if rail is bad or temperature between 10 degrees above to 20 degrees below zero, and 88 per cent. ("F" rating), and 85 per cent. ("G" rating), respectively, if temperature colder than 20 below zero—and a special rating is fixed by the master mechanic in case of an engine in bad condition—just out of the shop, etc., or by the superintendent during snow or wind storms, etc. A statement for the 24 hours ended midnight is made up and sent the General Superintendent by first mail showing each freight train run in the direction of balance of tonnage—between what stations, number of engine, class of rating, schedule load at that class of rating, tare, contents, actual and equivalent tonnage and particulars of any doubling or assisting. The percentage of total

TABLE 1.—HAVELOCK SECTION.

HAULAGE CAPACITY (IN TONS) OF LOCOMOTIVES, TARE WEIGHT, 33⅓ PER CENT OF GROSS WEIGHT.

From—	*153	145	140	120	115	110	105	100	95	90	85	80	70	65	60	55	50
East Bound.																	
Havelock	1968	1865	1800	1543	1479	1415	1350	1286	1221	1157	1092	1028	900	836	772	707	643
Central Ontario Junction	1241	1176	1135	973	932	892	851	811	770	730	689	649	568	527	487	446	406
†Tweed	1063	1008	973	834	799	765	730	695	660	625	591	556	486	452	417	383	348
Kaladar	1143	1083	1046	896	859	822	784	747	710	672	635	598	523	486	448	411	374
Mountain Grove	1175	1114	1075	922	883	845	806	768	730	691	653	614	538	499	461	422	384
†Sharbot Lake	1063	1008	973	834	799	765	730	695	660	625	591	556	486	452	417	383	348
Maberley	1273	1206	1165	998	957	915	874	832	790	749	707	666	582	541	499	458	416
Perth	1405	1331	1285	1102	1056	1010	964	918	872	826	780	734	643	597	551	505	459
West Bound.																	
Smith's Falls	1633	1547	1494	1280	1227	1174	1120	1067	1014	960	907	854	747	694	640	587	534
Perth	1121	1063	1026	880	843	806	770	733	696	659	623	586	513	476	440	403	367
Bathurst	1134	1074	1037	889	852	815	778	741	704	667	630	593	519	482	445	408	371
Sharbot Lake	1189	1127	1088	932	894	855	816	777	738	699	661	622	544	505	466	427	389
Mountain Grove	2006	1901	1835	1573	1508	1442	1377	1311	1245	1180	1114	1049	918	852	787	721	656
Ardendale	1121	1063	1026	880	843	806	770	733	696	659	623	586	513	476	440	403	367
Kaladar	1640	1554	1501	1286	1233	1179	1125	1072	1019	965	912	858	750	697	643	590	536
Hungerford	1461	1385	1337	1146	1098	1051	1003	955	907	860	812	764	669	621	573	525	478
†Tweed	995	943	910	780	748	715	683	650	617	585	553	520	455	422	390	358	325
Tweed	*1120*	*1061*	*1025*	*878*	*842*	*805*	769	732	695	*659*	*622*	*586*	*512*	*476*	*439*	*402*	*366*
Ivanhoe	1031	977	944	809	775	741	708	674	640	607	573	539	472	438	404	371	337
Ivanhoe	*1163*	*1102*	*1064*	*912*	*875*	836	798	*760*	*722*	*684*	*646*	*608*	*532*	*494*	*456*	*418*	*380*
Central Ontario Junction	1224	1160	1120	960	920	880	840	800	760	720	680	640	560	520	480	440	400

* % Eng. Cap. †Ruling grade.

net of British India would be established. At the same time a line has been surveyed which will lead from Tiflis in the Caucasus via Tabris through Persia to Bender-Abbas, with a branch from Baku on the Caspian Sea to Teheran. Another line is projected by Russia to connect Ashabad on the Transcaspian Railroad with Kerman, there joining the Tiflis-Bender-Abbas Railroad. A line from Bender-Abbas as central point to Kurachee

Some Oriental Railroad Schemes.

Railroad building in the Ottoman Empire is once more attracting considerable attention in Europe. Some weeks ago we noted that the Turkish Government had placed an order for 10,000 tons of rails for the Mecca-Damascus Railroad with the John Cockerill Company of Seraing, Belgium. The construction of the German Bagdad Railroad may soon be started. Siegmund Schneider, who has lived many years in the Ottoman Empire, has pust published a book on this line and its economical importance. He reviews the trade of Turkey, the commercial, agricultural and industrial possibilities of Asia Minor, describes the railroad surveys, the main stations on the line, the people of the districts through which it will lead, etc. The book is published by the Leopold Weiss Publishing Co. of Vienna and Leipzig.

German, French and English capital is already largely invested in Turkish railroads, and the Czar's government has made strenuous efforts to persuade the Sultan to order that new lines within the Russo-Turkish border districts of Anatolia shall only be built by the Turkish Government or by Russia. The latter country's influence in Persia is steadily increasing, and the trade of northern Persia has passed almost entirely into Russian hands. It is, therefore, not astonishing that the authorities in St. Petersburg want to keep their ways towards Persia open.

The Transcaspian Railroad is now completed as far eastward as Herat in Afghanistan and Samarkand and Kokhand in Turkestan. A link between Herat and Quetta via Kandahar has been surveyed, and by its completion direct communication with Kurachee on the Arabian Sea and the whole railroad

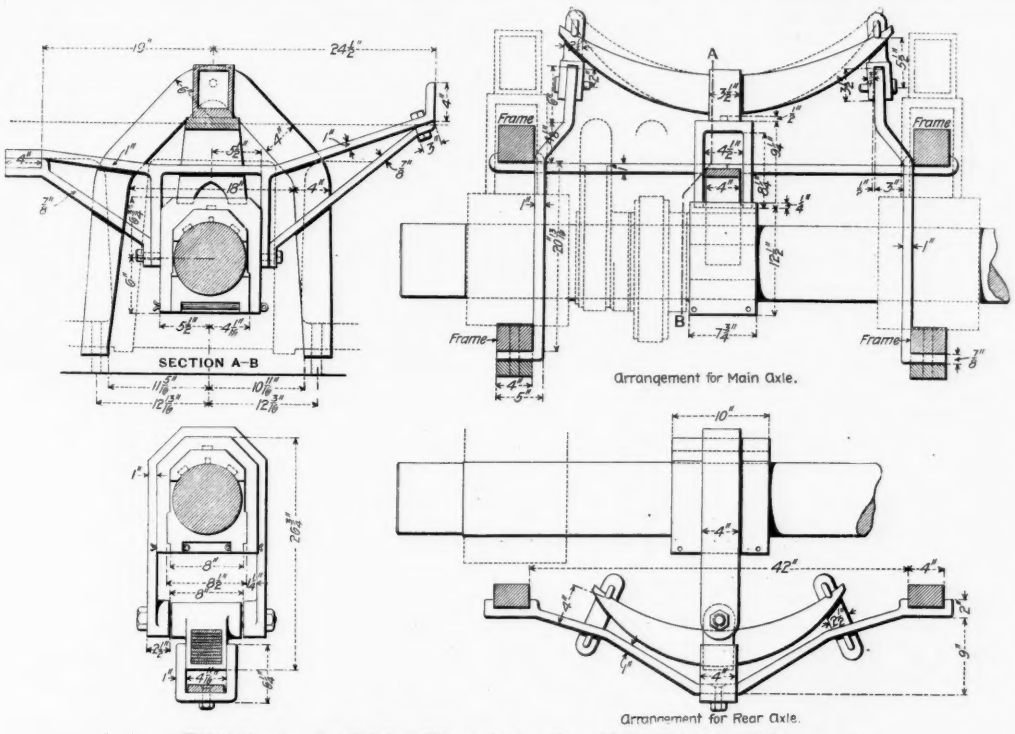
eastward and to Mohamerah and Bassora on the Persian Gulf westward has also been surveyed to establish, through the Bagdad Railroad, direct communication between India and Constantinople.

A Third Bearing For Driving-Wheel Axles—New York, Ontario & Western.

In 1895 there were built for the New York, Ontario & Western a number of mogul engines having cylinders 19 in. x 24 in., driving wheels 63 in. diameter and a total weight of about 135,000 lbs. in working order. Their rating back of the tender was 2,935 gross tons of trainload on straight and level track. They gave satisfactory service in everything except that the main and rear driving wheel journals ran hot. The diameter of these journals was eight inches. Mr. G. W. West, Superintendent of Motive Power, designed and patented a third bearing to be journaled on the driving axles at the middle, as shown in the accompanying illustrations. This device stopped the trouble, and it was successfully used for over a year before Mr. West took out patents and prepared for further use of it.

The illustrations show the quite different arrangement of the journals and spring suspension for the main and rear axles respectively. It may be seen that in the main axle equipment there is a yoke or bracket extension of the pedestal work of the bearing, going forward and upward to the belly brace and backward to a flat frame brace four inches wide, that crosses from frame to frame. The bearing on the back axles has no such longitudinal staying, and, within its yoke, rides freely on the axle, the springs and their hangers being arranged as shown. The ash pan prevents the use of any built up stays on the back axle journal, and it seems to have done very well without them.

This successful use of a third bearing will at once appear at its true value to those who have wrestled with weight distribution in restricted quarters. Probably there have been many places where it could have been used to advantage during the great overhauling of locomotives that has come about in the past five years, and it is equally probable that direct benefit may be had from its use where other relief from excessive journal load is hard to get.



Third Bearing for Driving-Wheel Axles—New York, Ontario & Western.

The Wear of Rails at Track Tanks.

Mr. Torrey, Chief Engineer of the Michigan Central, has made a good many interesting observations on rails and among others has endeavored to get some light on the relation between corrosion and wear in the destruction of the head of the rail. The experiment is described in the documents which follow, the first of which is Mr. Torrey's letter to us and the second is the report of the Inspector. We have plotted the wear as described in the Inspector's report in a diagram, which shows more clearly than the printed figures the relative wear in the 47 rails at the track tanks and the 40 rails either side.

Letter of Mr. Torry.

"While the information might not be valuable, I have always had a curiosity to know what proportion of the loss of the metal from the top of the head of the rail is due to rolling friction and what part is due to the action of the elements. I happened to think that I could get a little light on the subject by calipering the heads of the rails opposite a track tank and each way therefrom over which piece of track the trains run in one direction only. I anticipated that more loss of section would be found beyond the track tank in the direction in which the train was running than in advance of it, and simply as a matter of curiosity I send you herewith a copy of the report which my Inspector made. The track tanks are one double track, one for each track and have been in continuous service since 1893. Very little more than the normal amount of water reaches the rails of either track in advance of the track tank, but a good deal of water drips from the engine tank and car attached to the engine for quite a distance beyond. Of course, it is impossible to say whether or not these rails dry after the passage of one train before the passage of another. I should judge they are wet about 10 or 15 times a day. You may be expert enough to get the relation between oxidation of the rail and wear of the rail from such data as this, but all that I find is the self-evident fact that some of the loss of section is occasioned by exposure to rain and rust. About the only value this report may have is that all the rails reported on have been subjected to precisely the same traffic and with the exception of the wetting have given their service under similar physical conditions."

Report of Inspector.

"Following please find statement of wear of head of rail just at and each way from track tank at Forks Creek:

"Westbound track, north side: The 40 rails east of track tank are worn 1-64 in.; this is 1895 rail. The 47 rails just at tank are worn as follows: first five, 1-64 in.; for the fifth to the seventh, 1-32 in.; from the seventh to the ninth, 1-64 in.; from the ninth to the sixteenth, 1-32 in.; from the sixteenth to the eighteenth, 3-64 in.; from the eighteenth to the forty-first, 1-32 in.; from the forty-first to the forty-third, 3-64 in.; from the forty-third to the forty-seventh, 1-32 in.; this is 1893 rail. First five rails west of tank are worn 1-32 in.; next eight rails, 1-64 in. full; next twenty-seven, 1-64 in.; this is 1895 rail.

"Westbound track, south side: The 40 rails east of track tank are worn 1-64 in., 1895 rail. The 47 rails just at tank are worn as follows: First four, 1-64 in.; from the fourth to the eighteenth, 1-32 in.; from the eighteenth to the twenty-first, 3-64 in.; from the twenty-first to the forty-seventh, 1-32 in.; this is 1893 rail. First six rails west of tank are worn 1-32 in.; next eight rails, 1-64 in., full; next twenty-six, 1-64 in.; this is 1895 rail.

"East-bound track, north side: The forty rails west of track tank are worn 3-64 in.; this is 1890 rail. The 47 rails just at tank are worn as follows: First three, 3-64 in.; from the third to the sixth, 1-16 in.; from the sixth to the eleventh, 5-64 in.; from the eleventh to the eighteenth, 3-32 in.; from the eighteenth to the twenty-seventh, 7-64 in.; from the twenty-seventh to the forty-second, 3-32 in.; from the forty-second to the forty-seventh, 5-64 in.; this is 1890 rail. First 10 rails east of tank, 5-64 in.; next 10 rails, 1-16 in.; next twenty rails, 3-64 in.; this is 1890 rail.

"East bound track, south rail: The forty rails west of track tank are worn 3-64 in.; this is 1890 rail. The forty-seven rails just at tank are worn as follows: First four, 1-16 in.; from the fourth to the fourteenth, 5-64 in.; from the fourteenth to the twenty-second, 3-32 in.; from the twenty-second to the thirty-fifth, 7-64 in.; from the thirty-fifth to the forty-third, 3-32 in.; from the forty-third to the forty-seventh, 5-64 in.; this is 1890 rail. First nine rails east of tank are worn 5-64 in.; next twelve rails, 1-16 in.; next twenty rails, 3-64 in.; this is 1890 rail."

Automatic Block Signals on the Fort Wayne.

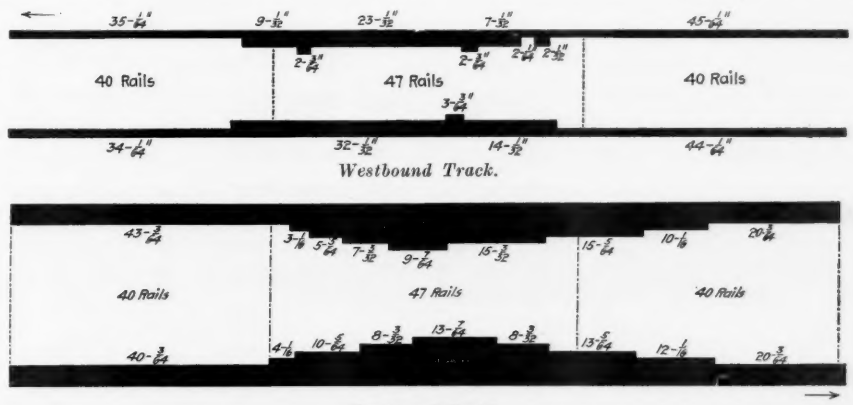
[WITH AN INSET.]

The line of the Pittsburgh, Fort Wayne & Chicago Railroad now consists of four tracks from the eastern terminus at Allegheny City, Pa., to Rochester, 24 miles from Allegheny. This is a busy through and suburban line, and a number of the Pittsburgh suburban trains run to Enon, 20 miles farther. The manual block system has been in use on this line for several years; but to make the necessary shortening of the block sections, to provide for the increasing traffic, automatic signals, worked by electric motors, have been put up, for all the tracks, from Allegheny to Homewood, 34 miles; 24 miles of four-track line and 10 miles of double track. These signals are different from anything heretofore used, in that there is but one signal for each track at the entrance of each block section, while yet the distant signal indication is provided for, the same as in automatic systems where two signals—a home and a distant—are used. This is effected by the use of the three-position semaphore, which Mr. W. M. Grafton, the signal engineer of the Pennsylvania Lines West of Pittsburgh, has used for 10 years, and which he has now adapted to this new purpose.

The arrangement of the signals for three consecutive sections is shown in Fig. 1 on next page. As will be seen from the sketch, the signal at the entrance of a section which is occupied by a train, stands in the horizontal position, as in the usual practice; but the signal at the entrance of the next section in the rear, which under ordinary practice would have two arms, one indicating all-clear for that section, and the other "caution" for the succeeding or occupied section, stands in the diagonal position. This indicates that the section immediately in front (B C) is clear, but that the signal at the entrance of the next section (C D) may be expected to be found in the stop position. The signal in the vertical or all-clear position as at A indicates that two sections in advance, A B and B C, are clear. In speaking of these signals, the terms clear, caution and stop are used for the three positions shown at A, B and C respectively.

Each signal is controlled by the track section immediately in front of it by means of the track circuit in the usual manner; but the control of signal B, for instance, by a train in section C D, is effected by means of a wire on poles from C to B. The signals are worked by electric motors of one-twelfth h.p., one at each signal. There is a dynamo in the power house at Conway, which furnishes current for all of the signals, and in addition there is a storage battery at each signal bridge. On the four-track section all of the signals are on bridges spanning the tracks.

In Fig. 3, 1 is the westbound passenger and 2 the eastbound passenger track; 3 is the westbound freight and 4 the eastbound freight track. It will be noted that the passenger tracks are not arranged in the same way throughout, as related to the freight tracks. From Jack's Run westward the passenger tracks are outside and the freight tracks inside, while east of that place the passenger tracks are in the middle. The curves in



The Wear of Rails at Track Tanks.

The Track Tanks Cover 47 Rail Lengths in the Middle of the Diagrams.

the drawing are conventional; no reduction of speed is necessary in passing from track 2 west of Jack's Run to track 2 east thereof. It will be observed that at all places where there are switches in the line, automatic signals are placed close enough to the interlocking to serve as convenient starting signals for trains which have passed through the inter-locking.

The motor moves the signal arm by means of an apparatus analogous to the electric slot, and it is called the slot instrument. The track relay, by which trains control the signal, is connected as shown at 38, Fig. 2, S being the "slot" mechanism and M the motor. When the block section A B is clear 38 is energized and holds up its armature; this energizes the slot magnet (12 Fig. 5, S Fig. 2) and locks the signal rod (5, Fig. 4) holding the signal in the all-clear position; the entrance of a train de-energizes 38 and 12, and thus unlocks the signal.

Before examining the action of this signal the functions of the different parts of the operating mechanism should be understood. The motor and "slot" are practically one machine, contained in an iron box, at the foot of the signal post. This machine was designed and patented by Mr. G. B. Gray. Fig. 2 is a diagram showing the simplest arrangement of circuits for the signals for two adjoining block sections; Fig. 3 is a diagram showing the arrangement of signals throughout the 34 miles of line referred to in the opening paragraph. Figs. 4, 5 and 6 show the operating mechanism of the signal, Fig. 7 shows a detail and Fig. 8 is the signal.

As shown in Fig. 5, the connection from the signal to its operating mechanism is formed by a sleeve 5 and a rod 6, fitting within the sleeve. The sleeve forms a guide for the upper portion of the rod 6. The sleeve is provided with wings 8, Fig. 4, which serve as guides sliding in grooves formed in the uprights 8a of the frame of the machine. The sleeve and rod are locked together by locking block 9, which has a locking projection 10 (see Fig. 7), to engage with notch 11, in the rod 6. This rod moves freely through the block when the latter is not held in position by lever 16 controlled by electromagnet 12, which is supported on sleeve 5. Links 15, 15, 16, 16, form toggle joints by which magnet 12, when energized, presses block 9 to the left; while, on the other hand, whenever 12 is de-energized the weight of sleeve 5, with that of the casting on the signal arm is sufficient to force block 9 to the right, and thus unlock rod 6 and permit it to slide freely in the sleeve. The reader should remember that to move the signal arm down, the rod 6 and sleeve 5 have to be moved up.

The signal is shifted to caution and clear positions by

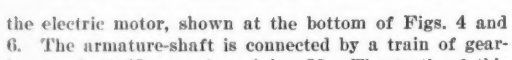


Fig. 1.—Three-Position Automatic Block Signals.

the electric motor, shown at the bottom of Figs. 4 and 6. The armature-shaft is connected by a train of gearing to shaft 19, carrying pinion 20. The teeth of this pinion engage a series of teeth on rod 6, and the rotation of the pinion thus lifts the rod and shifts the signal to the caution and clear positions. In order to permit the rod 6 to move down, after the signal has gone to "stop," without reversal of the motor and its train of gearing, some of the teeth on the pinion 20 are removed; when the untoothed portion of the pinion comes opposite the rack on rod 6 the latter is free to drop.

In order to relieve the train of gearing and motor from the weight of the signal when in clear and caution positions the pawls 21 21a are mounted so as to project into the path of block 9 when it is in locking position. These pawls are so located vertically on the frame that when the signal has been moved down to caution or clear position the projecting end of block 9 will have moved just above one or the other of them, which will drop under the projecting end of the block, and thereby prevent any downward movement of the sleeve (= upward movement of the signal arm) so long as the block is held locked. Block 9 and the pawls 21 21a are so beveled that the weight of the signal and sleeve will have a tendency to move the block to unlocking position. Arm 23 is a lock for holding the signal in stop and caution positions so long as track conditions require such positions. It is mounted on the frame of the machine in such position that the hook on its end will engage notches 24 on the sleeve when the signal is in stop or caution position. The hook is shifted to engage these notches by spring 25, which is held in a position in which the sleeve will be free to move by a magnet 27, Fig. 6, controlled by train movements.

The drum shown at 28, Fig. 6, is a brake to prevent over-running of the signal-shifting mechanism when the circuit of the motor is broken, but this is not used in the machines on the Fort Wayne road. When the brake is used its shoe is held away from the drum by means of electro-magnets 33, which are included in the circuit of the motor.

In order to prevent shocks to the mechanism when the signal is shifted, a cylinder 70, Fig. 6, constituting a dash-pot, is provided. Stem 72 of the piston is secured to the frame of the machine.

The motor circuits and the circuits for energizing the slot-magnet 12 are controlled by the movements of the signal, and to this end circuit-breaking mechanisms 34, 35 and 36, Fig. 4, are so arranged as to be opened and closed in a certain pre-determined order. These lie in the path of a projection or rib 37, carried by the sleeve 5. Circuit-breakers 34 and 35 are opened by the movement of the sleeve, while 36 is closed thereby. These circuit-breakers form a part of the motor-circuits, one of which consists, starting from the battery *p*, Fig. 2, of the wire 16, armature of relay 38, wire 6, circuit-breaker 35, wire 11, motor M; thence by wires 14 and 15 back to the battery. This is called the caution circuit, as when closed it moves the signal arm from the stop to the caution position. The other motor circuit, for moving the signal-arm from caution to clear, consists of battery *p*, wire 16, armature of 38, wire 6, circuit-breaker 34, wire 8, contact points 19 of relay 3P, motor M, wires 14 and 15 to the battery. Circuit-breaker 35 is closed when the signal is in the stop position. Circuit-breaker 34 of the clearing circuit is so located as to be closed as long as the signal is in either the stop or the caution position, but it will be opened by rib 37 as soon as the signal reaches the clear position. Both of these motor-circuits are controlled by the track-relay 38, so that as long as the track-relay is de-energized the motor-circuits will remain open.

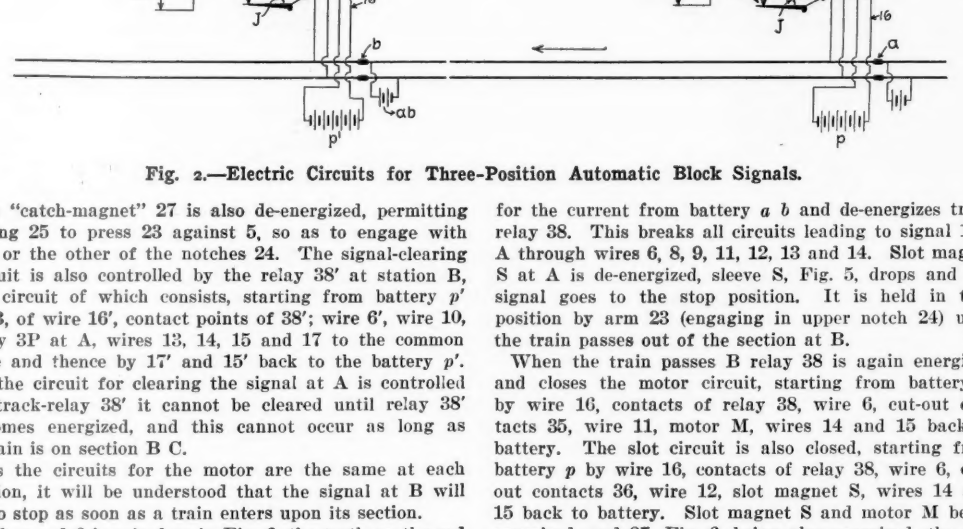


Fig. 2.—Electric Circuits for Three-Position Automatic Block Signals.

The "catch-magnet" 27 is also de-energized, permitting spring 25 to press 23 against 5, so as to engage with one or the other of the notches 24. The signal-clearing circuit is also controlled by the relay 38' at station B, the circuit of which consists, starting from battery *p'* at B, of wire 16', contact points of 38'; wire 6', wire 10, relay 3P at A, wires 13, 14, 15 and 17 to the common wire and thence by 17' and 15' back to the battery *p'*. As the circuit for clearing the signal at A is controlled by track-relay 38' it cannot be cleared until relay 38' becomes energized, and this cannot occur as long as a train is on section B C.

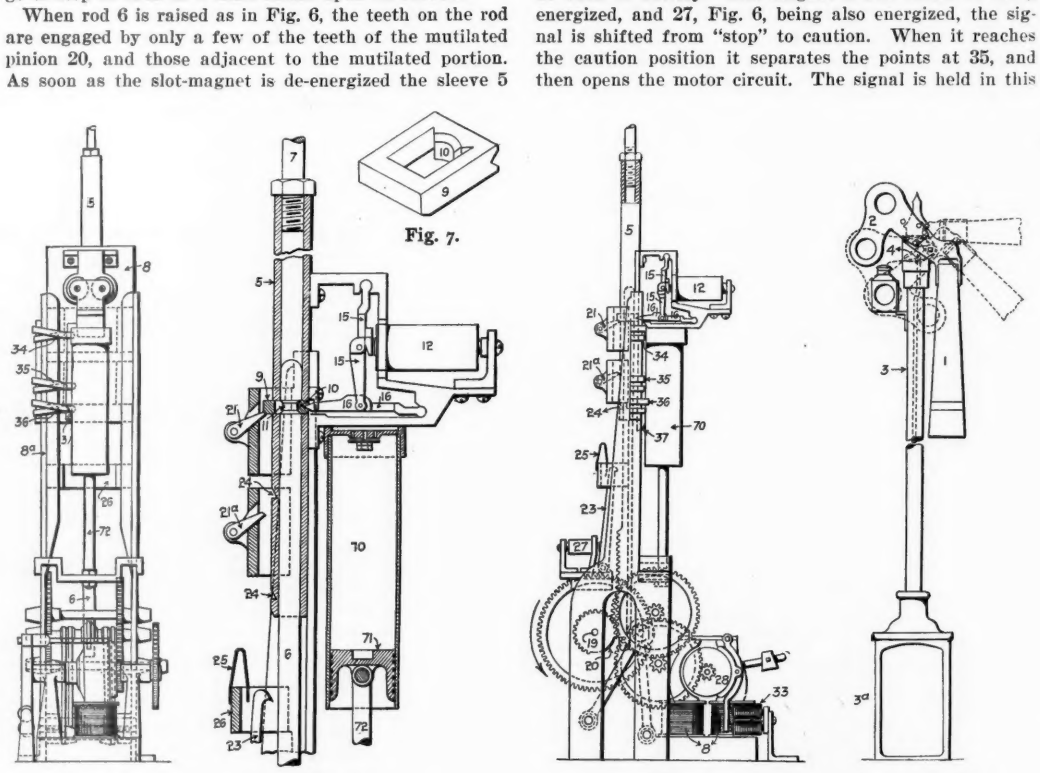
As the circuits for the motor are the same at each station, it will be understood that the signal at B will go to stop as soon as a train enters upon its section.

When rod 6 is raised as in Fig. 6, the teeth on the rod are engaged by only a few of the teeth of the mutilated pinion 20, and those adjacent to the mutilated portion. As soon as the slot-magnet is de-energized the sleeve 5 sleeve and signal, will be shifted to caution position, where the circuit-breaker 35 will be opened, opening the motor-circuit and de-energizing magnet 27; catch 23 will then engage with the lower one of the notches 24, thereby locking sleeve 5 so that the signal cannot be shifted to clear; but will not interfere with its further movement to stop position. When the signal moves to stop, in the manner described, catch 23 will engage the upper one of the notches 24 and hold the signal in that position, the circuit of magnet 27 being broken.

Fig. 2 shows the arrangement of the electrical apparatus and wires at two adjoining signals or stations, A and B. The two signals 1 and 2 are shown in the all-clear position, as this section (A B), also sections B C and C D, are clear of trains.

We may now follow the movement of a train from A to B, Fig. 2. The entrance of a train at A to section A B (or the presence of a pair of wheels at any point on the track between *a* and *b*) provides a short circuit for the current from battery *a b* and de-energizes track relay 38. This breaks all circuits leading to signal 1 at A through wires 6, 8, 9, 11, 12, 13 and 14. Slot magnet S at A is de-energized, sleeve S, Fig. 5, drops and the signal goes to the stop position. It is held in that position by arm 23 (engaging in upper notch 24) until the train passes out of the section at B.

When the train passes B relay 38 is again energized and closes the motor circuit, starting from battery *p* by wire 16, contacts of relay 38, wire 6, cut-out contacts 35, wire 11, motor M, wires 14 and 15 back to battery. The slot circuit is also closed, starting from battery *p* by wire 16, contacts of relay 38, wire 6, cut-out contacts 36, wire 12, slot magnet S, wires 14 and 15 back to battery. Slot magnet S and motor M being energized, and 27, Fig. 6, being also energized, the signal is shifted from "stop" to caution. When it reaches the caution position it separates the points at 35, and then opens the motor circuit. The signal is held in this



Figs. 4, 5 and 6.—Electric Motor and Locking Mechanism for Automatic Three-Position Block Signal (In Normal Position—Signal Indicating "Clear.")

drops along the rod 6, carrying with it the slot mechanism. When the motor is energized the pinion 20 will be rotated in the direction of the arrow and its teeth disengage from the rack of the rod 6, which will then drop sufficiently far to bring the notch therein in line with locking-block 9. As the slot-magnet is energized simultaneously with the closing of the motor-circuit, block 9 will lock the sleeve and rod together as soon as the notch comes into line with the block. By the continued rotation of pinion 20 the rod 6, and with it the position until the train passes out of block section B C. The sleeve 5 is held down by hook 23 engaging in lower notch 24, and it is held up by pawl 21a dropping under block 9.

When section B C is cleared, by the train passing C, relay 38' at B is energized; and this energizes relay 3 P at station A by the completion of a circuit from battery *p'* by wire 16', points of relay 38', wire 6', wire 10, relay 3 P, wires 13, 14, 15 and 17 to the common wire; from common wire by wire 17' and 15' back to battery.

Contacts of relay 3 P now being closed, a new path is provided for the slot circuit from battery *p* by wire 16, contacts 20 of track relay 38, wire 6, wire 9, contact 18, wires 12 and 14, and wire 15 back to battery. The motor circuit is also closed from battery *p* by wire 16, track relay contacts 20, wire 6, cut out 34, wire 8, 3 P relay contact 19, motor M, wires 14 and 15 back to battery. The motor and magnet 27 being energized the signal is shifted from the caution to the clear position. When it reaches that position the motor cutout 34 is opened and the signal is held there by pawl 21, block 9 being pressed to the left by action of magnet 12. In the movement from caution to clear, cutout 36 is opened and the slot circuit passes through relay contacts 18 and wires as last described.

In case a switch in section B C should be opened, or any break should occur in that track circuit, magnet 12 (S, signal 1, station A) would be de-energized (through 38') and signal 1 would go to the stop position; but 12 will be immediately re-energized, as, although 3 P at A is

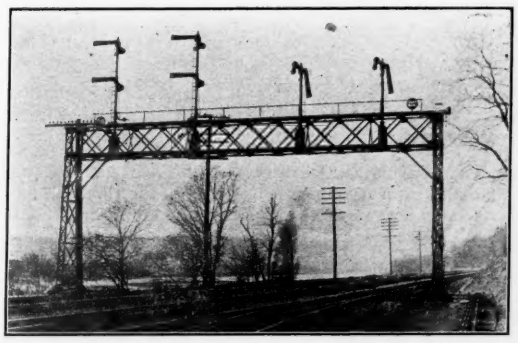


Fig. 9.—Signal Bridge No. 27, Near Glenfield, Pa., Looking West.

opened, by the opening of 38', a path for the motor circuit is provided by circuit breaker 36, which is closed by the movement of the signal from the clear to the stop position.

The track relays used are two-point or double-contact relays and were made to carry two separate circuits. A wire, termed a "jumper," is soldered across, connecting together the two armature levers and the relay is used as a single contact relay. This was done to increase the carrying capacity if the current should become excessive.

At 5, Fig. 2, is shown the location of a cutout in the main feed wire, which is operated by the movement of the signal mechanism, and which is designed to automatically open the circuits leading to the signal and prevent waste of battery, if wires 9 and 12 should become broken or disconnected.

Fig. 9 is a view of signal bridge No. 27 looking west. This bridge is near Glenfield, Pa. It is at the west end of an interlocking and the eastbound signals (shown in the stop position) are controlled by the signalman. The upper arms are semi-automatic and the lower arms wholly mechanical.

Fig. 10 shows bridge 28 at Agnew, Pa., looking east. The two eastbound signals indicate caution and the two westbound all-clear.

Fig. 11 shows the arrangement of signals and electrical connections at a junction where the automatic circuits must be under the control of an attendant. The switches and switch locks and the signals (like 2 and 12) which govern movements that are wholly within the yard, are worked by levers in a mechanical frame in the usual way; signals *y* and *z*, which are for movements wholly outside the interlocking limits are entirely automatic; and the signals (1 and 14) which control high-speed movements through the yard are worked by electric motors and controlled by the track circuit, but are also controlled by the signalman, who can set them in the stop position at any time by opening the electric circuit which holds them in the clear position.

Signal *z* is shown, with its electrical connections, at *zk* and *y* at *yk*; these are controlled by the track circuits the same as the signals in Fig. 2.

Signals 1 and 2 are shown at 1 *k*. Signal 1 is controlled by relay *Tk*, the same as by relay 38 in Fig. 2; and relay 3 *Pk* performs the same function for the track circuit beyond signal *y* as does the similar relay in Fig. 2 for section B C.

The circuit breaker at 1 *d* is open whenever signal 1 is in the stop position, thus insuring that the distant indication for signal 1 shall always be "caution" when 1 indicates stop.

Lever No. 1 for signal No. 1, is shown at *Lk*. The signalman is free to reverse the lever whenever it is not locked home (it is locked home mechanically whenever switch 5 or switch 7 is not set for the main track, and whenever signal 12 or signal 13 is cleared); but reversing lever No. 1 does not clear its signal unless the track is clear from signal 1 to signal *y*; for the track circuit of this section (battery 43, relay *Tk*) controls the lever by circuits presently to be described.

At 40 is shown the electric lock for lever No. 1. This lock when de-energized holds lever No. 1 immovable (if the lever is in the normal or "stop" position) and it is energized (unlocking the lever) only when its circuit is closed at *g* and at *ks*.

At 48 is shown a rotary circuit controller which is operated by the movement of the latch lever on lever No. 1. The "stick relay," 41, is to compel the signalman to return the lever to the normal position before clearing the signal a second time. The "lever relay," 42, is energized only when lever No. 1 is reversed. In these semi-automatic signals this relay controls the same circuits that the track relay does in the entirely automatic.

The arrangement of circuits is as follows: From battery by wire *a*, track relay contacts *b*, wire *c*, circuit controller 48 at contact *d*, wire *e* stick relay 41, wire *f* back to battery. When 48 is shifted by lifting the latch lever, contact *g* is closed and *d* is opened, the stick relay circuit remaining complete through wire *h*, stick relay contact *i*, relay 41, wire *f* to battery. Contact *k* of the circuit controller 48 has also been closed, completing the lever relay circuit through *a*, *b*, *c*, *k*, wire *L*, contact *m*, wire *n*, lever relay 42, wire *f*, back to battery.

When relay 42 is closed by the action of the signalman on the latch the signal circuits will be completed through its contacts, the same as they are through the track relay in the entirely automatic, and the signal is shifted by the motor from "stop" to go ahead.

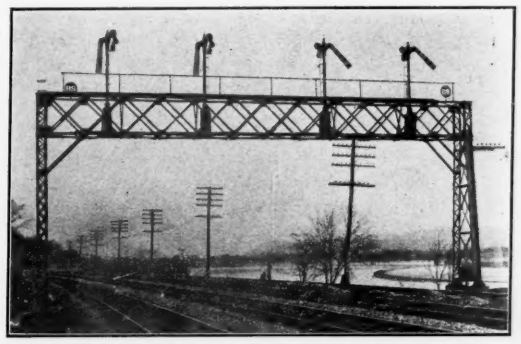


Fig. 10.—Signal Bridge No. 28, Agnew, Pa., Looking East.

When a train enters the block section between signal 1 and signal *y*, track relay *Tk* is opened, the circuits through stick relay 41 and lever relay 42 are broken and the signal is shifted to stop. Stick relay 41 will remain open as no current can pass through its coils until lever 1 is returned to its normal position completing the circuit for 41 through *d*.

Thus the putting of the signal to the stop position is done in a manner similar to that described in Fig. 2; but the movement of it the other way is controlled by the signalman, through 48 and 42. Closing 42 has no effect on the signal unless the track is clear, as the presence of a train on the track between 1 and *y* will hold the motor circuit open at *Tk*, and a train between *y* and the next block signal will hold it open at 3 *Pk*, the same as in Fig. 2. When, by lifting the latch preparatory to pulling the lever, the signalman closes 42, he closes the motor circuit at *c*; but if the track is clear only to *y* the signal will be moved only to the caution position; while if the section beyond *y* is clear the signal will be moved to the clear position.

When lever lock 40 is de-energized and its armature down it locks lever No. 1 immovable, provided the lever is in its normal or "stop" position. When the signalman lifts the latch preparatory to pulling the lever he closes the circuit of 40 at *g* and thus causes 40 to unlock, provided its circuit is also closed at *ks* (wires 50, 51 battery, wires *f* and 49); and it is closed at *ks* if the signal is in the stop position.

On the approach of a train from the east the signalman, if the westbound track is clear as far as *y*, proceeds to pull lever 1 to put the arm of signal 1 in position to admit the train. He must first release the lever by lifting its latch; this moves 48, closing *g* and opening *d*; (41 is not affected, as it has two connections from 48); lifting the latch also closes *k*, closing 42; and this last starts the motor to move the signal arm downward.

The slot machine circuit closers shown on this plan are the same as those shown in Fig. 2, except that there is a fourth one, *ks*, its function being to close the lock circuit when the signal is at "stop."

The control of lever No. 14 is arranged in the same way as that of No. 1.

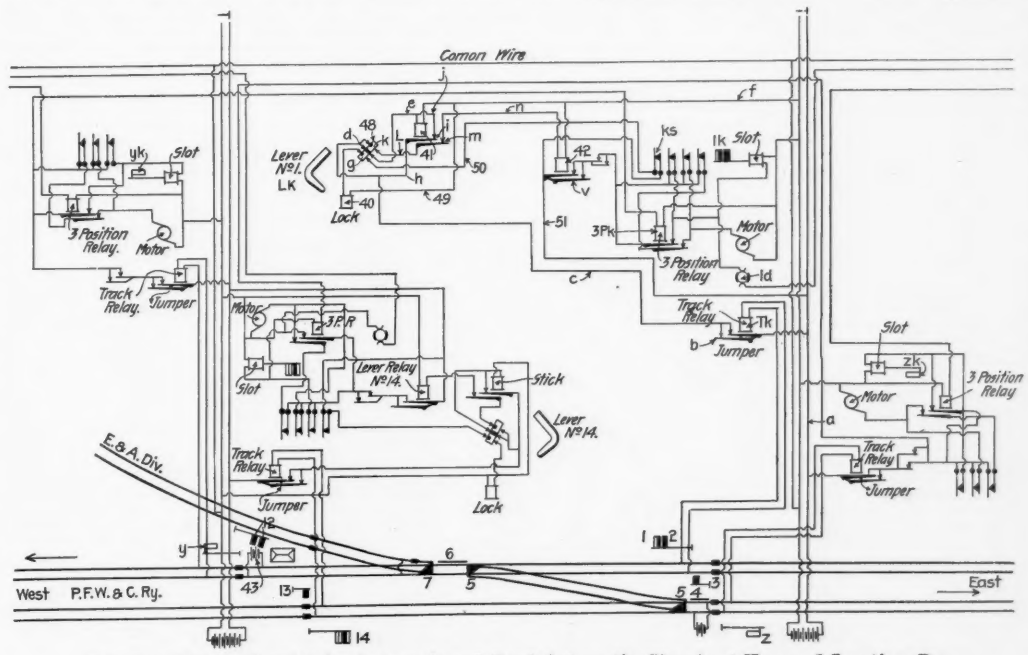


Fig. 11.—Electric Circuits for Automatic and Semi-Automatic Signals at Kenwood Junction, Pa.

Foreign Railroad Notes.

On occasion of the fiftieth anniversary of the accession of the ruling Emperor of Austria, an association of railroad men established a fund for paying dowries to the daughters of railroad employees. Dec. 2 last, the anniversary, dowries to the amount of $100 each were given to 15 such young women.

One of the results of the railroad accident at Dax has been an inspection of the Northern Railroad's line between Paris and Calais by a special train made up of passenger cars just like the fastest express, with weights at the several seats to represent the passengers, and with two-truck inspection car in the rear, with instruments delicate enough to register the passage of every rail joint. This inspection train was run at the fastest express speed. On this line no defects were reported, and all the other lines of the company are to be tested in the same way; that is, at the speed of the fastest train over them.

The Hungarian State railroads issue yearly commutation tickets good over the whole state system, which is by far the larger part of the mileage in the country, at the rate of $202 first class, $141 second class and $81 third class. Similar tickets are issued by the Austrian State railroads, but usually only for a part of its system; and likewise by the larger Austrian railroad companies, at varying prices, according to the extent of the lines over which the ticket is good.

In England, with their chain couplings, the yard shunters and other men working about freight trains have to have a pole with which they can, while standing outside the line of the cars, lift a coupling hook out of its link, or a link over a hook; and an up-to-date "gentleman" of Glasgow, moved by the difficulties encountered by shunters, has invented a coupling pole which can also be used as a lantern, the pole having an electric battery in its handle end. The light is at the other end and is imbedded in the pole and protected by heavy glass. Besides being a light to aid the man in coupling, it can be changed so as to show red or green, and thus be made available as a hand-signal light.

Already there are complaints that the Asiatic Midland Railroad (late Trans-Caspian) is unable to carry all the freight offered it. It is asked that the road be prepared to carry 18,000 tons of cotton from Turkestan to the Caspian every month, which would make 1,335 Russian carloads, which seems not an excessive requirement; but it is said that it cannot do it. A grumbling Turkestan newspaper, not satisfied with the excuse that the railroad has not cars enough, points out that 300 of its freight cars are used as barracks for troops in a single town.

Since the accident at Dax, the speed of the Paris-Madrid express, which on the French section had been nearly the fastest in the world, has been reduced on that section; but on the Spanish section, where it had been comparatively slow, it has been increased, so that the time between Paris and Madrid has been lengthened but little.

Hereafter railroad station masters in Russia are to receive and deliver registered letters, on arrangement with the local post-offices, and also sell postage stamps, etc.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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Where Should the Distant Signal Be Placed?

At the last meeting of the Railway Signaling Club, at St. Louis, the most interesting discussion was that on the location of automatic signals, following the reading of a paper on the subject by Mr. Rosenberg; and one of the most suggestive questions raised in the discussion was that propounded by Mr. Sperry, "When should the distant signal be placed on a separate post, and when on the same post with the home [of the next block section in the rear]?"

As Mr. Sperry was not present at the meeting to enlarge upon his question, it did not get the thorough airing that, by its importance, it deserved, and it may not be out of place to recur to it again.

The first point in connection with a distant signal is, What is it for? In the language of the American Railway Association it is to regulate the approach of trains to the home signal. To get a definition with more meaning in it we had better make two: The distant signal, when "off," is to assure the engineman beforehand that he will find the home signal "off," or all-clear; when "on" it is to warn him to expect to find the home signal "on," that is, indicating "stop." Every reader will, no doubt, agree to these definitions; but not every speaker at St. Louis appeared to fully agree to this view at the time, hence this restatement. It should be added, perhaps, that the signal is not for anything else. It has nothing whatever to do with the right to, or the condition of the track between itself and the home signal, though both American and English railroads for years kept in their books a rule implying that it did control or protect this bit of track. Some such rules are still in existence. A rule saying that an engineman must reduce his speed as soon as he sees a distant signal against him, is one of this kind, or practically the same; it disregards the principle embodied in the definition which we have quoted. If the home signal is a considerable distance beyond the distant, it may be necessary to keep steam on for some time after passing the distant. The distant signal, when "on," tells the engineman to stop at a certain place; but what superintendent ever thought of making a general rule to instruct the enginemen of all kinds of trains, heavy and light, slow and fast, in good weather and bad, where to shut off steam to stop at any given point? And yet that is just what we are trying to do when we say, in a rule, that a certain (or uncertain) distance in the rear of the distant signal is the place where, always, steam should be shut off for the purpose of stopping at the home signal.

Mr. Sperry's question reminds us that some distant signals are 1,000 ft. in the rear of the home signal, while others are 4,000 ft. and even more. In making a single rule for all distant signals it is important to bear this great variation in mind. There is no use in trying to tell the engineman to always do a certain thing at the distant signal, because for different distances he must do different things. The ideal would be to have each distant just far enough back to enable the train to stop by the time it reached the home; but to do this we should have to have uniform grades, uniform speeds and uniform brake power. Not having these, we must leave the whole matter of regulating the speed to the discretion of the engineman. To try to do it for him implies that his judgment is not trustworthy. It is true that in practice enginemen's judgment often does prove untrustworthy, and it is a duty to correct this defect; but the enactment of complicated rules is not the way to do it. The only rational way to get along with distant signals at varying distances is to regulate the speed of each train at each signal according to the needs of the case; and although Mr. Sperry, in his question, was considering distant signals which are too far back, we may remark in passing that this is also the rational solution of the question as regards distant signals which are not back far enough. If, for example, the signal is 2,000 ft. back, and some very fast train cannot surely be stopped in less than 2,500 ft., the simplest remedy is to reduce the speed of that train at that place. If, in clear weather, the runner can be depended upon to see the distant signal 500 ft. before he reaches it, and thus can safely keep up his full speed, it is important for him to understand that in fog, or whenever his 500 ft. view is cut off, he will not be expected to make time.

The question before us may be changed to read, What disadvantage is there in having distant signals farther away than is necessary to enable the average train to stop at the home signal? The disadvantage most discussed at St. Louis was, that enginemen of slow trains would come to be careless about the indication of the distant, or even to forget it and disregard it. As slow trains necessarily take a long time to travel from the distant to the home, the signalman, as, for example, at a crossing of another road, is obliged to keep the distant against such trains so as not to unnecessarily detain trains on the other road. But why should the signal engineer try to provide for this difficulty? He must provide a distant signal for fast trains; and he cannot make one signal just right for both slow and fast. The superintendent must train his enginemen to obey the signals as they are.

Both with fast trains where the signal is not far enough distant, and with slow trains where the signal is too far distant, the remedy is, therefore, a matter of discipline. But Mr. Sperry had chiefly in mind, no doubt, the delays to fast trains, where the discipline is all right, but the distant signals are too distant. The ideal block signal system, or the condition wherein a block system gives the ideal service, is that where a train running at high speed follows another train, running at the same speed, as closely as the length of the block sections will allow. With block sections 4,000 ft. long and distant signals on the home signal posts, as in automatic signaling like that of the Pennsylvania and the Lehigh Valley, such trains must be 8,000 ft. apart; and in practice they ought to be separated a little farther than this so as to give the engineman a few seconds leeway to get his distant indication. Moreover, in measuring the capacity of the road we must add the length of one train; for the front of the second train is governed by the rear end of the leading train. Now, if these trains can be stopped in 2,000 ft. the establishment of a distant signal at that distance from each home would shorten this interval between the trains from 8,800 ft. (more or less) to 6,800 ft. If the train could be stopped in 1,000 ft. the reduction would be to 5,800 ft. If block sections are 8,000 ft. long, the reduction would be a larger percentage, say, from 16,800 ft. to 9,800 ft., or about 42 per cent., as against 34 per cent. with the shorter blocks. The capacity of the road is will be justified? The practical result of shortening correspondingly increased.

As the larger railroads frequently desire to run two or more fast trains as closely together as possible, the demand for the abolition of unnecessarily long distances between home and distant signals will probably increase; but as these long-distance distants are found wholly in connection with automatic systems, and as the purpose in placing the signals too far back is simply to save the expense of separate posts and connections, it appears to be chiefly a question of cost. Can separate posts and relays be provided for distant signals at such prices that the expenditure will be justified? The practical result of shortening the space interval is to give, in the case of delayed trains, or when there is a large excursion movement, a shorter time interval between trains, and better service to the passengers.

With passenger trains following one another closely, the enginemen, with distant signals far away, are constantly under temptation to run as though there were no distants at all; that is, to pass every distant while it is "on," knowing that the home will probably be off before they reach it. But if a runner is at all anxious to make time, this practice of depending on probabilities will sometimes be carried too far, unless the discipline is very good. Thus the value of the distant signal is nullified.

Revised Time-Tables and Rules on the Burlington.

The Chicago, Burlington & Quincy on December 1 adopted a revised code of train rules and rules for the employees of the operating department, and the same code was at the same time adopted on all of the roads comprising the "Burlington Route." On the main line from Chicago to Burlington only a few freight trains are now shown on the time-table, and these are timed only at the division terminals. For example, way freight No. 91 leaves Clyde (Chicago yard) at 4:30 a. m., and is due to arrive at Aurora at 2:10 p. m. No intermediate times are given. Through freight No. 71 leaves Clyde at 6 a. m., is due at Aurora at 7:46 and at Mendota at 9:46. Between Clyde and Burlington the time-table classification of freight trains is abolished, and extra freights have the same right to the road as scheduled freights. A rule on the time-table says: "The right of any train to proceed will be indicated by the position of the train order or block signal. A clear signal will give to any train for which it is displayed the right to proceed in advance of first-class trains without train orders. Extra trains will not display classification signals. Scheduled freight trains will not be run in sections."

Extra trains do not require running orders between Chicago and Burlington. Between Clyde and Aurora there are three main tracks and the block signal rules forbid permissive signaling; west of Aurora permissive signaling is allowed, except that the block behind a passenger train must always be absolute. Between Clyde and Mendota train order signals stand normally in the stop position; west of Mendota train order signals stand normally in the all-clear position.

The abolition of running orders and the adoption of a rule fully utilizing the block system has resulted, as was to be expected, in a very satisfactory improvement in the movement of trains. On the division from Chicago to Mendota, 83 miles, where the number of trains averages about 150 a day, the delays to freight trains have been reduced one-third. Keeping freights moving as long as possible ahead of delayed passenger trains must, of course, reduce the number of times that they will have to be side-tracked. It is somewhat curious that in this matter of getting the full benefit of block signals we Americans have been so slow to learn the lesson which the practice of the English railroads ought to teach us. But few American roads have adopted the practice which is now in force on the Burlington; although, as we showed last week, over 50 of them have introduced the block system to a greater or less extent. Perhaps we had better not be quite so fast in calling the Englishmen slow.

The abolition of classification signals on the extra trains of the Burlington is a minor point which should not be overlooked. If the Burlington has been using clean white flags, it will now save some little trouble and expense; while if, like most roads, it has been using dirty ones, the appearance of the trains will be improved an appreciable percentage. The change must be as agreeable to the runners as would be a new coat of paint all around.

The new code of general rules follows very closely the latest revision of the American Railway Association. The time interval between all trains (Rule 91) is five minutes. Rule 102a reads: "Yard limits will be designated in the time-table or indicated by marked posts or signs. Engines may work within yard limits without train orders; they must clear the time of first-class trains ten minutes, unless fully protected by fixed or hand signals, but may work against all other trains. All trains will reduce speed in passing through yard limits and proceed only as the way is seen or known to be clear."

The rules for the movement of trains by telegraphic orders are made up of the "general principles" and cannot well be defined as rules, though it may be that some local or other notice has been issued explaining them. For example, Rule 206 says that regular trains will be designated in train orders by their numbers, adding engine numbers "if desired." It would seem that the person whose desire should govern in this matter is the officer who issues the book, but his desire is not here expressed. Rule 221, which gives directions about the train order signal, is given in two forms, one in which the signal stands normally at stop and the other in which it stands normally at all clear; and a footnote says that both forms have been adopted, leaving it discretionary to adopt one or both, according to the circumstance of the traffic; but who is to exercise discretion is not stated.

Rule 221C reads: "Orders addressed to operators restricting movements of trains will be respected by conductors and enginemen the same as if addressed to them. Operators, in such cases, will deliver copies of the order to all trains affected, until all have arrived from one direction, when the train-order signal will be changed to "proceed," if there are no other orders in effect at that station."

In the list of authorized abbreviations we find "Com."

for "complete;" "Psgr." for passenger, and "the usual abbreviations" are allowed to be used for the names of stations. The train order blanks and clearance cards are not headed with the name of the road, but with the legend "Burlington Route." The pictures illustrating hand motion signals include one of a man swinging a lantern in a horizontal circle (apply air-brakes). The rules governing the transmission of train orders have no provision for "O K," but the "X response" is used for acknowledging without repeating.

Following the diagrams illustrating the hand signals and the manner of using flags and lanterns, come the block signal rules, including definitions, requisites, adjuncts, etc. From a cursory examination we judge that the latest standard code is here followed quite closely. The rules prescribing the procedure in a block station to admit a train to a block, are given in four forms, 317A, 317B, 318A and 318B. Here again we find the phraseology left just as it is in the standard code. Under Rule 318B permissive blocking is to be done by a caution signal *or* a caution card. The rules for interlocking are numbered from 601 to 686, inclusive. Eight pages are devoted to cuts illustrating the language of semaphore signals.

The rules addressed to particular classes of employees are numbered from 901 to 1,191. These rules are quite full, following in general the style of those printed by a committee of the American Railway Association in 1894.

The Burlington has also issued a revised book of instructions "of the Freight, Operating, Auditing and Treasury departments to Agents and Conductors." This is a book of 150 pages, somewhat larger than the ordinary train-rule book; and the number of rules is 497. This is one of the best examples that we have seen of this kind of book. It is divided into four divisions for the rules of the four departments named, and the index fills 20 pages. Every paragraph gives evidence of the most thorough study and care, and the whole book appears to be based on long experience, intelligently written out and condensed.

The River and Harbor Bill.

We noted last week briefly the main items of the River and Harbor Bill, namely, that it carries cash appropriations to the amount of $22,800,000 and continuing contracts for upward of $37,000,000. The aggregate to complete projects for which estimates have been made approximates $300,000,000. The debate on the bill was opened on the 9th by Mr. Burton, of the committee, who said that the distinctive features of the bill were the large appropriations for deepening the harbors of the great ports. He said further that the sundry civil appropriation bill would carry about $8,000,000 for work on continuing contracts, making the total expenditure for 1902 about $32,000,000.

A debate of a very sectional character was speedily entered on. Mr. Burton himself characterized the project for the Dalles ship railroad, provision for which is repealed by this bill, as more worthy of Jules Verne than of the House of Representatives. Mr. Bell (populist of Colorado) wanted something done for irrigation of arid lands and will offer an amendment for an appropriation of $300,000 for reservoirs at the headwaters of the Platte and Arkansas. Mr. Mondell (republican of Wyoming) attempted to show that the money spent on the Missouri and Mississippi might have built reservoirs at the heads of those streams which would have controlled floods and insured navigable water throughout the year. He also wants the Government to begin to reclaim arid lands. Mr. Corliss (republican of Michigan) wants to raise the level of Lake Erie two feet at low water. He said the bill should be entitled "the liver and lights bill," the humor of which may be apparent to someone. Mr. Wilson (silver republican of Idaho) asked why the committee in killing the Dalles ship railroad should not provide for a system of locks and dams, to which Mr. Burton replied that this would cost $4,000,000, and $2,000,000 is provided in the bill already for work at the mouth of the Columbia. He did not think that it would be right to make the bill "a bill for the improvement of the Columbia River."

A chart was displayed in the lobby showing the distribution of the "pork." This showed that the seventeen States having members on the River and Harbor Committee would receive $14,238,000 in direct appropriation and $24,458,000 authorized, a total of $38,956,000. Adding the Mississippi and Missouri river items, there would be left but $8,350,000 to be divided among the twenty-eight States and four Territories not represented on the committee, ten States and four Territories receiving nothing. Mr. Cushman (republican of Washington), who had prepared this chart, said that a bill like this should be for the benefit of the whole country, not for the benefit of the members of the Committee, his notion of benefiting the country being, obviously, the distribution of money pro rata in the Congressional districts. He said that he himself represented a city that had a tonnage of $6,000,000, and it got the "measly" sum of $30,000. He said "if you think my vote can be bought at that price you are off your base." If the bill is regarded as a scheme for distributing the money of the people among the States and Territories, this, of course, is a valid argument. It does not, however, strike one as being a scientific criticism.

The real value of this debate is in its candid and unblushing cynicism. We do not remember that Congressmen have ever before admitted so plainly that the River and Harbor Bill is a simple means of patronage. They have felt it necessary ordinarily to pretend in public that the bill was framed with a view to the commercial value of the improvements.

The most important section of the River and Harbor bill appears to us to be that one which provides for a board of revision. Under this the Chief of Engineers shall detail five engineer officers to act as a board of revision, to whom shall be referred all reports of examinations and surveys provided for by Congress and all projects or changes in projects for works of river and harbor improvement heretofore or hereafter provided for. In doing this the Board shall consider the amount and character of commerce existing or reasonably prospective, which will be benefited by the improvement, and also the public necessity for the work and the propriety of its construction, continuance or maintenance at the expense of the United States. Such consideration shall be given to works that have heretofore been provided for by Congress, the same as in the case of new works. This Board shall have authority to employ civil engineers as may, in the opinion of the Chief of Engineers, be required. The necessary expenses of the Board shall be paid from appropriations made for the works to which the duties of the Board pertain.

It is high time that such co-ordination of control should be undertaken, and there is no body of men in the United States so fitted for such work as the officers of the Corps of Engineers. They should be, and almost always are, beyond the influence of political and local pressure. They, better than any other body of men in the country, can approach these subjects from the standpoint of general national interest.

The best method of stopping a street car is still undiscovered. We mean a method by which the intending passenger shall cause a car to be stopped. We do not refer to the mechanical problem of arresting a moving mass, which is comparatively simple. The passenger's problem includes certain extremely variable elements of a psychological character. If you are a man you will assume a dignified attitude at the street crossing and slowly raise your cane or your umbrella. If you are a woman you will run back and forth between the track and the curb, showing great agitation and indecision. In either case the result is uncertain, and if you were trained in Chicago you will probably jump and grab something and trust to Providence. If you were trained in St. Paul you will wait until the motorman has, by an ingenious system of levers and couplings, opened the gate on the rear platform, and as the car is not started until the motorman has again closed this gate, you will have a fair chance of getting seated before you are yanked off your feet. These are the extremes, and between the methods of these two cities there is a wide range of practice. The matter is further complicated by the uncertainty as to the intentions of the motorman. In Chicago, for example, you cannot judge, unless you are a mind reader, whether or not he has seen you, although if he turns his head aside and squirts tobacco juice to the middle of the other track you may be fairly certain that he has seen you; but even then his intentions are not revealed. In New York, on the other hand, the courtly motormen, trained by Brother Vreeland, smile pleasantly and raise their hats, and here again we see a wide range of practice. Certain enterprising gentlemen have lately been trying experiments in this field. In Chicago a man described as a saloonkeeper, hailed three consecutive cars, each one of which passed without slackening speed. When the fourth one came along he pulled his "gun" and began shooting. His purpose was misunderstood by the motorman, who, instead of stopping, quickened his speed and got out of the zone of fire as soon as he could, mistaking the fare for a highway robber. In any other city this misapprehension would not have been so likely to occur, and yet this method is open to the objection that your wishes may be misunderstood. In St. Louis a gentleman standing in the rain tried also to stop three consecutive cars, each one of which passed regardless. When the fourth one came along he threw a stone at it, which broke a window, and the conductor stopped the car to have the experimenter arrested, thus enabling him to go aboard and take a seat. In the police court the judge fined this passenger and immediately remitted the fine, being a magistrate of liberal mind and interested in the new problems of municipal life. On the whole, the St. Louis method appears to be the better one.

The Railroad Commissioner of Michigan complains because the Legislature has forbidden him to use more than 300 pages in which to print his annual report. The annual reports of the railroad companies, formerly printed verbatim, are, he says, wanted by many people, and he asks that the law be changed at once. We are sorry to see this rebellious spirit. The Commissioner should at once go to work and condense his report so that it will go into 250 pages. He will then get the laugh on the Legislature and do a great service for the readers of the reports. If the clerical force of the office is too small to properly condense the railroad companies' reports, we would condense as many as the time would allow and condense the others next year. A condensed report is just what the readers want, if the Commissioner only knew it; and a well edited report every other year would very likely be more useful than a full report, such as most States publish, every year. Those legislators may not have had any higher motive than blind money-saving, but they builded better than they knew. It would be a good thing all around if some other Commissioners should be restricted in the same way. They could take a profitable lesson from Poor's Manual.

NEW PUBLICATIONS.

The Postal Deficit. An Examination of Some of the Legislative and Administrative Aspects of a Great State Industry. By H. T. Newcomb. Octavo, 158 pages. Washington: William Ballantyne & Son. Price $1.

Mr. Newcomb has become well known to railroad officers and to those interested in social economics by several books and by frequent papers contributed to periodicals and associations. The material collected in this small volume was prepared originally for presentation before the American Association for the Advancement of Science at its annual meeting last June. It has been revised and expanded and is published because it was believed that it would be useful in considering the question of adjusting payment for the services rendered to the Post Office Department by the railroads of the country. Mr. Newcomb is a careful writer and of judicial temperament, so that the reader feels confidence in the fairness of the statements made. The main purpose of the book appears to be to expose the errors of the few theorists and others who for the last few years have been trying to convince Congress that the price paid by the Government to the railroads for carrying the mails was too high. This makes the book appear like an argument for the railroads; but these theorists delight in foisting upon the newspapers such a mass of extravagant opinions and careless statements of fact that it is well that their fallacies have been here exposed. Prof. Henry C. Adams, who made a report on the mail service for the Joint Postal Commission is criticised severely, and most of his conclusions are characterized as worthless.

But without reference to the opinions or the methods of students or experts—and Mr. Newcomb is very cautions in his own recommendations—the book is valuable as a brief compend of the principal known facts bearing on the cost and the value of railroad mail service, and the remuneration which the railroad companies receive for carrying it on. Mr. Newcomb shows that a surplus from the operations of the Post Office department—the officers of the department are constantly aiming to make it self-supporting—might be no better for the welfare of the public than a small deficit; for postal charges have a good deal of the nature of a tax, anyway.

The Progress of Invention in the Nineteenth Century. By Edward W. Byrn, A. M. Large octavo, 476 pages. Index and numerous illustrations. New York: Munn & Co., 1900. Price $3.

A review of the progress of invention in the nineteenth century is a tremendous task for anybody to undertake. To do it adequately one should have the immense knowledge and the power of generalization of Herbert Spencer, the imagination of Tyndall and Huxley's faculty for clear and concise statement. It is superfluous to say that the author of this book does not combine these powers. He has, however, made a running review which will be convenient as a book of reference and interesting for occasional reading. One of his chapters is a chronology of leading inventions of the century, which is convenient and fairly comprehensive. In two chapters he deals with the electric telegraph and the Atlantic cable; in three chapters with the dynamo, the electric motor and electric lighting. A chapter is given to the telephone and another to miscellaneous electrical inventions. Three chapters are given to the steam engine, the railroad and steam navigation. Then the author takes up printing, the typewriter, sewing machine, reaper, vulcanized rubber and chemistry. Fifteen chapters which follow treat, among other things, of surgery, optics, civil engineering, wood and metal working, firearms, textiles, ice machines and liquid air. Still another chapter deals with minor inventions and patents of the principal countries.

Condensers. One of a Series of Lectures by F. R. Low. Reprinted from *Power*. 79 pages. New York: Power Publishing Co. 50 cents.

This treatise opens with an elementary study of atmospheric pressure and results, and includes practically every form of condenser that is used in connection with steam engineering. Jet, surface, injector or syphon, and exhaust steam induction condensers are considered under separate heads and are carefully treated. The book contains 13 convenient tables beginning with a consideration of the physical properties of steam, and closing with tables showing efficiencies of various pumps under given conditions. It is well illustrated, contains formulæ and examples of their application, and will be found a valuable reference on this subject. The theory of condensers, their application and economy, the quantity of water required for successful operation under various conditions, and methods of analysis and computation of the performance of condensing apparatus receive due attention.

A Treatise on Wooden Trestle Bridges. By Wolcott C. Foster. Quarto, 271 pages. Index and illustrations. New York: John Wiley & Sons. Price $5.

The first edition of Mr. Foster's book was published about 10 years ago, many of the articles which go to

make up the volume having been printed at the time in the *Railroad Gazette*, by special arrangement with the publisher. The book is the only one of its kind in the world, so far as we know; that is, it gives numerous examples of practice which in many respects is peculiar to America, and gives these examples in great detail as to drawings and description. In this third edition the author adds a new section giving examples of electric railroad trestles. He has given additional data of the life of piles and as to particulars of pile driving and equipment for such work. He has added also detailed descriptions of methods of inspection followed on several railroads and has added information as to unit stresses, etc., as recommended by a committee of the Association of Railway Superintendents of Bridges and Buildings. Two new chapters deal with temporary trestles, washouts, etc., and with the renewal and replacing of trestles.

Thirty-first Annual Report of the State Board of Health of Massachusetts. Boston: Wright & Potter Printing Co., 18 Post Office Square.

The annual reports of the Massachusetts State Board of Health are always valuable documents. This one contains the general summary of the year's work of the board; a statement in detail of advice to cities and towns on water supply and sanitation; of examination of water supplies and rivers; a summary of water supply statistics, and reports on the purification of sewage and filtration of water. It contains also special reports on a number of other subjects. We notice that while the death rate of Massachusetts has averaged for the past 50 years about 19.5 per 1,000, in the last three years it has run 18.1, 17.5 and 17.4. The death rate from typhoid fever, which may be taken as an index of the sanitary condition of any community, has fallen at a very important rate. In the five years 1871-75 it was 18.2 per 10,000. In the four years 1896-99 it was 2.6. In those last four years also there was a decrease from 3.1 to 2.4. The death rate from consumption fell from 41.1 per 10,000 in 1851-55, to 18.7 in 1899. Attention is called to the fact that in this very marked diminution of the death rate from consumption the saving of life is greatest at the wage-earning period, namely, from 15 to 60 years, since it is at this age that consumption is most fatal.

Up-to-Date Air-Brake Catechism. By Robert H. Blackall, Air-Brake Instructor and Inspector with the Westinghouse Air Brake Co. Twelfth edition, revised and enlarged. 12mo, 254 pages, with index and illustrations. New York: Norman W. Henley & Co., 1900. Price $1.50.

The preface to the first edition of this book is dated October, 1898, and now the twelfth edition appears, which of itself is sufficient evidence that it answers the purposes for which it was designed, and it is hardly necessary to write a review of a book so well known. The scheme is to cover by questions and answers the whole field of the working and maintenance of the air-brake, which of course involves detailed description of the mechanism. Besides the characteristics and duties of the brake mechanism proper the author treats of leverage, of air-brake recording gages, of bell ringers and track sanders.

Field Manual for Engineers. By Philetus H. Philbrick, C.E., M.S., M. Am. Soc. C. E., Chief Engineer, Kansas City, Watkins & Gulf Railway, Lake Charles & Gulf Coast Railway, N. Am. Land & Timber Co., etc.; sometime Professor of Civil Engineering at the State University of Iowa. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1901. $3.

The appearance of this book seems to indicate that there is still extant an idea that railroad engineering means field geometry. In his preface the author states that among other things he has aimed "to treat the general problems of railway engineering more extensively than other similar works have done," and he has then produced a book on railroad field geometry not unlike a half dozen others—no fuller in essentials, no better in arrangement, and less complete than at least two others in his statement of the real general problems of railroad engineering.

Modern Locomotives, 1901 Edition. Illustrations, Specifications and Details of Typical American and European Steam, Electric and Compressed Air Locomotives. Large Quarto. Cloth. 532 pages. 837 engravings. New York: The Railroad Gazette. Price, $7.00.

In 1883, and again in 1886, the *Railroad Gazette* reprinted in a large quarto volume the illustrations of locomotives which had appeared in its pages for some time past under the title "Recent Locomotives." In 1897, "Modern Locomotives" was brought out, which was of the same form as "Recent Locomotives," but differed in its scope and make-up. The greater part of the material was furnished especially for this book by railroads and locomotive builders, and the whole work was directed by the late David L. Barnes. This book, with about 400 pages and over 500 engravings, forms the only convenient record of the locomotive practice of a period of ten years ending 1897. The well-worn copies now to be seen in railroad drafting rooms all over the country are probably the best evidence of its usefulness.

Before starting on the work of the 1901 edition of "Modern Locomotives," the plan of the book was carefully considered, and on the recommendations of railroad men it was decided to keep the material of the 1897 edition intact, adding to it the specifications and drawings of typical locomotives built during the last four years. This has resulted in a book containing about 125 pages more than the 1897 edition and with something like 275 additional engravings. The new edition was prepared by Mr. J. C. Whitridge, Associate Editor of the *Railroad Gazette*.

The new edition has supplementary articles on recent improvements in locomotives and locomotive tests, and the table of fast and usual runs has been brought up to date. The same plan is followed in grouping the simple engines and the compound engines according to types, and the arrangement of the specifications in tables is the same as was used in the former edition. The engines are numbered consecutively throughout the book as are also the engravings of details. All are covered by an index.

In selecting engines built after 1897, the aim was to take only those which represent the latest practice or that for special reasons are notable. Thus of the eight-wheel type, the locomotive at the Purdue testing plant is notable for its 250-lbs. boiler pressure and its cylinder arrangement and the engine will doubtless be referred to often in connection with experimental work; the details of the boiler and cylinders are therefore shown in addition to general views. The recent eight-wheel passenger engines of the Chicago & Northwestern are interesting as being quite near the practicable limits of the eight-wheel type, and so on throughout the whole list. Those engines which will probably be referred to many times during the next few years and used as the basis for new designs have so far as possible been illustrated by numerous dimensioned, detail drawings. In this way wide fire-box engines and the largest engines of the several types are given a prominent place. The book contains all of the important dimensions of nearly every engine illustrated. The dimensions and other data are given in tabular form, and each tabular statement is in fact a specification. All information required for comparisons of tractive power, weight, heating surface, grate area and other important features of the various designs can be readily found. There are 15 pages of miscellaneous details, which are grouped together as they do not apply to any particular locomotive. There are also additions to the foreign, compressed air and electric locomotives.

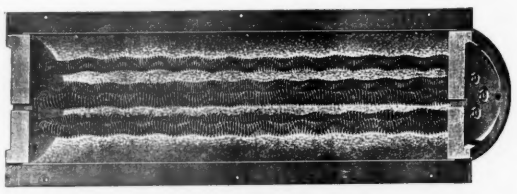
It is believed that the 1901 edition, bringing "Modern Locomotives" up to date, will be found of great value to railroad officers, designers and others interested in an accurate record of locomotive practice covering a period of about 15 years.

Steel Specifications.—Mr. T. L. Condron, Chicago, Consulting and Inspecting Engineer and representative of the Pittsburgh Testing Laboratory, Ltd., sends us an interesting diagram showing graphically a comparison between the rolled steel specifications recommended by the American Branch of the International Association for Testing Materials and 39 existing specifications of prominent railroads, engineers, bridge companies and others. This diagram is printed on cardboard and can doubtless be obtained by application to Mr. Condron.

Gold's Electric Heaters.

In our issue of Aug. 5, 1898, we described, with illustrations, the improved electric car heater then made and sold by the Gold Street Car Heating Company. This has continued in use, giving satisfactory service and gaining in popularity, and a number of improvements have been made.

The arrangement of the resistance coils is an important



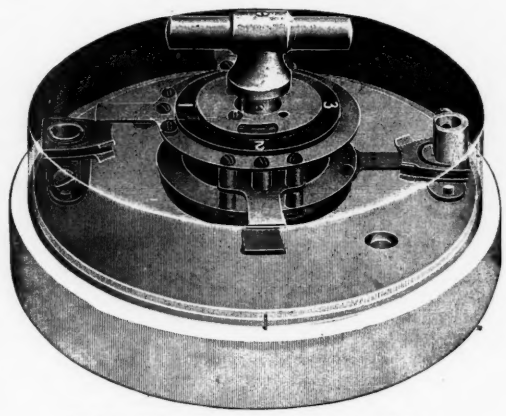
Gold's Ideal Electric Heater.

feature of this heater. Each of these coils is supported on a rod carried from end to end of the heater, which holds the coil firmly, prevents vibration, and yet gives large space for the circulation of air through the coil. The wire used for the resistance coils is of special composition and not liable to corrode. It is found that it does not deteriorate or change in resistance; consequently, these heaters do not increase in consumption of current from year to year. In this it is claimed they are unique. They have been on the market for about six years, and over 60,000 have been sold, and we are assured that there is no recorded instance of failure. The wire is wound on an open pitch and is under no strain when put on the rod. Moreover, if by chance it should be broken there is no danger of a short circuit through the heater casing as the coil is held safely in its proper position.

A recent improvement is the substitution of a wrought iron heater casing for cast-iron. This is to reduce weight and it saves about 150 lbs. to the car where eight heaters are used. The back of the casing is lined with asbestos and the case is stamped up from one piece of metal, and it is stamped with ribs to give stiffness and also to hold the asbestos lining somewhat away from the casing, thus giving an air space.

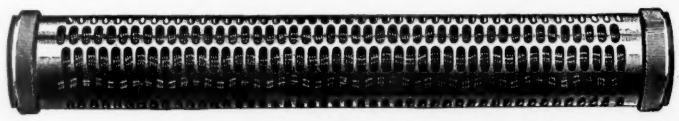
One engraving shows the Gold standard electric heater used for cross seat cars and for elevated railroad cars. A number of these have been applied also in 60 ft. coaches on electrically-worked suburban lines of large steam railroads. This standard heater is arranged to provide three graduations of heat and is especially suited for location under car seats.

The company furnishes an improved regulating switch



Gold's Three-Point Regulating Switch.

more substantial than anything heretofore used. It will easily control a circuit using 30 amperes at 500 volts. The exterior casing of this is not shown in our engraving, but it carries a dial with large figures to be easily read. The movement of the switch is rapid and does not carry the arc. The contacts are heavy and strong and the spindle is substantial. The company makes about 30 different styles of electric heaters.



Gold's Standard Electric Heater.

Interstate Commerce Commission on Safety Appliances.

An abstract of the annual report of the Interstate Commerce Commission was published in the *Railroad Gazette* of January 11. Since then the full text of the body of the report has been received and we give some points gleaned from the chapter on safety appliances. This chapter opens with a paragraph warmly commending the railroads for the rapidity with which they have done the vast amount of work necessary to comply with the law concerning automatic couplers. "The undertaking stands as a monument to the energy of the railroad companies." The report also recognizes the useful work done by the Master Car Builders' Association and the American Railway Association before the passage of the law on this subject. Statistics for the last fiscal year being as yet incomplete, accounts of casualties occurring in coupling and uncoupling cars have been gathered from "the public prints;" and from these accounts it appears that up to December 1, 255 persons had been killed and 609 injured. This statement covers, we assume, the four months from August 1, when the law went into full effect. Of the 864 casualties, it appears that 618 were either "purely accidental or resulting from carelessness;" and 229 were caused by defective appliances. It is hoped that the publication of these figures will impress upon employees the necessity of exercising caution, and the secretary has sent a letter to the brotherhoods calling their attention to the subject and warning them that the law does not fully release them from responsibility for contributory negligence. The report continues:

The making up and movement of trains will always be a very hazardous business, and death and injury thereby caused cannot be wholly avoided. In this connection the Commission desires to invite attention to what was said in its last report to Congress, for the Commission believes it as necessary to inculcate care on the part of the men as it is for the railroads to keep their equipment in order. It was recently decided by the Supreme Court of Kansas that where there were two ways of doing a given thing connected with the operation of a train of which the employee had knowledge, it was the duty of the employee to adopt that method which was the least hazardous, and that his failure to adopt the safer method relieved the employer from liability for his injury, unless the employer had knowledge or apprehension of the employee's perilous position and made no effort to avoid injuring him.

In this case a workman, who had knowledge of a grossly negligent and wantonly reckless habit of his employer, voluntarily placed himself unnecessarily in a dangerous position whereby he received injuries resulting fatally, when there was a safer way to perform the duty known to the employee. The court held him guilty of contributory negligence. (Beal vs. A., T. & S.

F. Ry. Co., 62 Pac. Rep., 321.) It will thus be seen that this court held that the rule of non-liability for contributory negligence in case of injuries recklessly inflicted does not apply when the injured person had or should have had knowledge of the grossly negligent habit or the impending reckless act and could have avoided the injury to himself by prudence and caution upon his own part.

During the year ending June 30, 1899, the number of employees killed in coupling and uncoupling cars was 260, a decrease of 19 from the preceding year, but there are no exact statistics showing how many men were employed in each of the two years. It is proposed hereafter in the annual reports to classify employees more correctly. For the year to June 30, 1900, statistics are given for 89 roads, working 70 per cent. of the mileage of the country, showing the number killed in coupling and uncoupling as 231, an increase of 32 over the preceding year. On these roads the number of trainmen employed to one killed was, in 1899, 591; in 1900, 540; injured, in 1899, one in 22; in 1900, one in 31. In this reckoning the term "trainmen" includes switchmen, flagmen and watchmen, but excludes enginemen and firemen. While there is here shown a large increase in the number killed, there was in the number injured a decrease of nearly 25 per cent.

In support of the proposition to have government inspection of cars and train service, switching, etc., the report quotes some of the recommendations made during the past year by the temporary inspectors who have been employed by the Commission. These inspectors have had experience in train work and are well acquainted with the requirements of the rules of the Master Car Builders' Association. From their reports it appears that "violations of the law consist chiefly in failure to keep the equipment up to the required standard. Inspection by the Government has acquainted the railway presidents with conditions existing on their respective roads, of which they probably would not have been apprised in any other way. Probably 20 per cent. of the couplers now used become non-automatic through failure to keep them in proper repair. While in such condition they are far more dangerous to the men employed in handling the cars than the old link and pin coupler. When an accident in coupling now occurs it is said there is more probability of its resulting fatally. Again, when it was known that the men had to go between the cars to couple or uncouple it is claimed that engineers exercised greater care than they do now. Car inspectors should reject any car having defective couplers or other defective safety appliances, as they now do on account of imperfect running gear. The most common defects in couplers are disconnected pin chains and loose brackets.

"Inspections have been openly made, the inspector always introducing himself to the management and disclosing his identity. Railway officials generally are much interested in this inspection work, and the majority of them appear surprised to learn that so many automatic couplers are in the condition found by the inspectors. Some few roads have claimed exemption from the law on the ground that their operation was confined to the limits of a single State. On many roads the smaller parts of the automatic couplers are neglected—such as cotter keys, clevis chains, and knuckle pins. The tail end of the knuckle and the locking pin or block should be lubricated. Where both narrow and standard gauge cars are used on the same train it is necessary to use the 3-link coupling, which is especially dangerous. There are too many different kinds of couplers in use and they are not placed on the cars with any uniformity as to the location of uncoupling rods, thereby causing great danger in coupling and uncoupling cars, in many cases the trainmen being required to run along with the car, holding the lever up.

"Among the defects observed are the following: Coupler chains too long or too short; rods not adjusted to locks, and often no locks at all; short handles; rods placed on wrong side of the car, and coupler not properly secured to the car. One inspector recommends that dead-blocks on each side of drawheads be dispensed with and that engineers be compelled to give warning signal before putting on air-brakes. Failure to give such warning is alleged to be the cause of so many brakemen being thrown from the cars.

"Numerous accidents occur from carelessness due to men going between cars unnecessarily to raise the chain with their hands; men have got into the habit of doing this instead of using the lever because many of the chains are too long; many roads use chains made of split links and S hooks, which should be discontinued for the solid link with the clevis. With some kinds of couplers, the parts of which are not interchangeable by reason of being out of order, the link and pin must be used; the practice of carding defects furnishes the men with an opportunity to be negligent; the practice of not using more than 40 per cent. of air in trains and scattering air-brake cars through the train instead of placing them next to the engine, should be condemned. All trains should be inspected by an air-brake inspector and not by the ordinary trainman; more care should be taken, not only in the inspections, but in repairing defects when found, and, further, a larger percentage of cars should be equipped with air-brakes. These are not recommendations of the Commission, but are deemed worthy of consideration.

"There has been criticism of the couplers now in general use for the alleged reason that they are not really automatic in many circumstances and because failure to make proper repairs renders the coupler a menace to the employee rather than an instrument of safety. Already an agitation has been begun for the use of other and better appliances, and the Commission has been asked to order tests of automatic couplers, but it has given no encouragement to such requests. None of this agitation comes from organizations of employees."

The Interstate Commerce Commission again puts forth the inaccurate statement that the British safety appliance law, passed last July, confers full powers upon the Board of Trade to order the use or disuse of any safety appliance. The fact is that the law contained a list of what classes of safety appliances should be subject to it, and in this list couplers are conspicuous by their absence.

TECHNICAL.

Manufacturing and Business.

R. D. Wood & Company, of Philadelphia, has an order for 3,000 tons of cast iron water pipe for Samarang, Java. The pipe varies in sizes from 4-in. to 30-in., and is valued at $70,000, approximately.

The Robert Aitchison Perforated Metal Co., 303 Dearborn street, Chicago, is busy on orders for perforated metals for use in fanning mills, ice machines, clay screens and cottonseed oil machinery, besides small orders for repair work. The year is starting out with every evidence of continued prosperity in their line.

Iron and Steel.

Messrs. Townsend, Reed & Co., Chicago, Ill., and Fort Wayne, Ind., will soon be in the market for rails for the Fort Wayne & Southwestern Traction Co.

A shipment of 2,615,600 lbs. of steel was made from the Homestead Works of the Carnegie Company early this week for new docks at Galveston, Tex.

The Secretary of the Navy last week closed the contracts with Cramp & Sons, of Philadelphia, for cruisers Nos. 4 and 7 not yet named. One of the vessels will be sheathed and one unsheathed.

The Senate last week passed the bill providing for a steel revenue cutter for service in Boston Harbor, to cost not over $50,000. This bill was favorably reported by the Committee on Commerce of the Senate, and was indorsed by the Secretary of the Treasury.

Arrangements have been made by the St. Clair Steel Co., recently organized by stockholders of the Crucible Steel Co. of America, to build an open-hearth steel plant and to issue $2,250,000 of 5 per cent. gold bonds to pay for the same. The Garrett-Cromwell Engineering Co. of Cleveland, Ohio, will make the plans. A site has been definitely decided upon.

Cumulative preferred stock of the Cramp Ontario Steel Co., to the amount of $500,000, bearing 7 per cent. interest, is offered to the public by a Toronto broker. The company will build blast furnaces, steel plant and rolling mills at Collingwood, a port on Georgian Bay. The daily capacity is to be 200 tons. The steel plant is to have four 30-ton open-hearth furnaces. The directors of the company are: Wm. M. Cramp and George O. Angell, of Philadelphia; Hon. Sir Charles Hibbert Tupper, Victoria, B. C.; Hon. J. R. Gowan, Q. C., Barrie, Ont.; F. A. Clergue, of Sault Ste. Marie; John J. Long, Collingwood; W. C. Matthews and A. McDonald, of Toronto. Walter Kennedy, of Pittsburgh, is the Consulting Engineer.

A New York Rapid Transit Contract.

The contract for building the section of the Rapid Transit Railroad lying between 41st street and Park avenue and 47th street and Broadway, has been let to Benezette Williams, of Chicago, Ill. This section is one of the most difficult in the whole route.

Erie's Compressed Air Plant at Port Jervis.

A Fairbanks-Morse 12 h.p. air compressor will be put in Port Jervis yard of the Erie; the yard will be piped so that air-brake cars can be tested at any point in it. All air-brake cars will be properly tested and defects repaired at once. This plant is to be used for no other purpose.

Bids for Aqueduct Work.

Bids for doing the work and furnishing the materials for building of the Muscoot dam, in the Croton River at Muscoot Mountain, in the towns of Somers and Bedford, Westchester County, New York, are wanted by the Aqueduct Commission before 12 o'clock noon of Jan. 29. John J. Ryan, President; Harry W. Walker, Secretary; Room 207 Stewart Building, 280 Broadway, New York.

American Bridge Company.

The American Bridge Company announce the following appointments: E. W. Stearns has been appointed Manager of the East Berlin (Conn.) plant; Frank S. Moore has been appointed Manager of the Lafayette (Ind.) plant. All the Pittsburgh plants have been consolidated and J. W. Walker has been appointed as Manager. C. A. Billings has been appointed Assistant Treasurer for the New York District and H. W. Post has been appointed Manager of the Post & McCord plant.

The American Bridge Co. have grouped all their Eastern plants in one section, and have appointed A. J. Major, formerly Manager of the Bridge and Construction Department of the A. & P. Roberts Co., as Manager of all of these plants, which include the following: The Pencoyd plant, the East Berlin plant, the Buffalo plant, the Edge Moor plant, the Elmira plant, the Groton plant, the Hilton plant, the Horseheads plant, the Trenton plant, the Post & McCord plant, the Rochester plant and the Union plant.

Masonry Contracts on the Rio Grande Western.

Mr. E. J. Yard, Chief Engineer of the Rio Grande Western, Salt Lake City, Utah, is advertising for proposals for masonry abutments for steel girders to replace wooden and combination structures on the main line of his road. There are abutments for 84 spans and the clear height runs from 13 ft. to 24 ft. The cement concrete abutments will contain approximately 12,000 cubic yards, the stone masonry approximately 14.000 cubic yards. Plans, specifications, etc., will be furnished on application and bids will be received until noon of Feb. 11.

Copper-Sheathed Coaches for the Erie.

The record of some three years of use of copper-sheathed passenger coaches, on the Erie Railroad, was briefly given on page 752, *Railroad Gazette*, Nov. 16, 1900. It was there said that four coaches were thus sheathed and doing well, and that the building of similar cars would depend largely on the price of copper. It is now possible to state definitely that the 25 coaches which the Wason Manufacturing Co., Brightwood, Mass., is building for the Erie, and also the four coaches which the same company is building for the New Jersey & New York, duplicates of those for the Erie, are all to be sheathed with copper on the exterior. There is nothing new about the coaches except that the seats will be without aisle arms and there will be no basket racks, as the cars will be used in commuting service out of Jersey City.

Pratt & Whitney Co. Absorbed.

Negotiations for the absorption of the Pratt & Whitney Co., of Hartford, Conn., by the Niles-Bement-Pond Co., have been completed. The Pratt & Whitney Co. makes small machinery, the Niles-Bement-Pond Co., heavy machinery. The old stockholders of the Pratt & Whitney Co. retain the $1,225,000 of preferred stock but the $1,525,000 of common stock has passed into the hands of the Niles-Bement-Pond interests. The new Pratt & Whitney Co. organized by electing the following directors: R. C. McKinney, of New York; T. T. Gaff, of Cincinnati; F. W. Gordon, of Philadelphia; Amos Whitney, of Hartford; C. C. Cuyler, of New York; George W. M. Reed, of Hartford; W. L. Clark, of New York; C. L. Cornell, of New York, and J. K. Cullen, of Hamilton, Ohio. The directors organized by electing Mr. McKinney President, Mr. Clark Vice-President, Mr. Cornell Treasurer, and Francis C. Pratt Secretary. Mr. McKinney is also President of the Niles-Bement-Pond Co.

Centrifugal versus Steam-Jet Blowers.

To settle the comparative efficiency of centrifugal fan blowers versus steam-jet blowers for boiler draft, Mr. B. R. Healey, of London, recently made some experiments on a standard type of refuse burning furnace having 25 sq. ft. of grate surface. "In each furnace the the furnace was got to full heat before commencing to record the results, and every care was taken to ensure precisely similar conditions for each test. The steam pipes were well covered with hair felt, the steam pressure was kept at 80 lbs. during each trial, and the blast mains and blower outlets were all 9 in. in diameter, which is the minimum for 25 ft. grated. The first experiment was with a Korting steam-jet blower, the initial nozzle being 0.25 in. diameter, which gave a pressure of 0.20 in. water gage. The second experiment was with a small high-speed engine geared direct to a Sturtevant centrifugal blower, and by using exactly the same weight of steam the pressure was increased to 0.60 in. In these two experiments the furnace gases passed through a multitubular boiler 10 ft. long and 6 ft. diameter to a stack which was 40 ft. high above the grate. Two other experiments were afterwards made without the boiler, and the furnace gases passed direct to a special chimney 12 ft. high over the furnace, and it was found that with the same blast pressure the incinerating power of the furnace was as nearly as possible the same as before, which indicated the extra duty the stack has to perform when steam generators are used. A fifth experiment was made with four Korting steam-jet blowers of the same size as the one used in the first experiment. These were fixed to a sole-plate at the top of the chimney 12 ft. above the furnace and used as exhausters. The ash-pit doors being open, it was found that the indraught at the furnace doors was only 0.25-in. water gage. The power of the furnace was considerably less than in the other experiments, although using four times the quantity of steam. The result was anticipated, but the experiment was made to convince certain parties of the folly of using steam-jets to any large extent in chimneys."

THE SCRAP HEAP.

Traffic Notes.

The Butte, Anaconda & Pacific has reduced all passenger rates to 3 cents a mile.

The Delaware, Lackawanna & Western will, on Feb. 1, begin limiting local tickets to two days, and abolish the use of stopovers except on summer tourist tickets.

The Great Northern has announced that, beginning

Feb. 1, local passenger rates will be reduced to the uniform rate of 3 cents a mile throughout the states of Montana and Idaho.

A press despatch from Harrisburg, Ill., says that in the Circuit Court of Saline County the Cleveland, Cincinnati, Chicago & St. Louis road has confessed judgment in a suit brought against it for $2,000 penalty for discriminating in freight rates.

A press despatch of Jan. 13 reported that in seven days the Philadelphia & Reading had carried to tidewater 314,000 tons of anthracite coal, the largest week's movement on record. The shipments of soft coal over the Reading are also heavier than ever before.

The Advisory Committee of investors and others appointed at the last meeting of western railroad presidents in New York City held a meeting this week, but, according to reports, found that there was nothing for the Committee to do at present. "Rates are being enforced in a very satisfactory manner."

The Pennsylvania Railroad announces that on Feb. 1 the rates on iron and steel articles from Pittsburgh to the Atlantic seaboard will be reduced 5 cents per 100 lbs.; that is to say, from 35 cents to 30 and from 30 cents to 25. Billets will be reduced 50 cents a ton ($2.40 from Pittsburgh to New York instead of $2.90), and pig iron 60 cents a ton (from $2.80 to $2.20). The new rates will be the same as those prevailing from Buffalo to New York. Under ordinary conditions, as heretofore existing, these reductions would have been made about April 1, and it is reported that they are made earlier on account of the urgent demand of the Carnegie Steel Company.

Make-Up of Brooklyn Bridge Trains.

The Brooklyn Heights Railroad Company announces that beginning on Monday next local bridge passengers traveling on the bridge railroad trains from Manhattan will be accommodated by the exclusive use of the easterly gate and stairway in the terminal at Manhattan, the one farthest from Park Row. The forward car of each train from Manhattan to Brooklyn will be used only by local bridge passengers, who, upon arrival at Brooklyn may descend directly into High street by a short and convenient staircase which has been built for their accommodation. All the stairways and entrances to platforms at the Manhattan terminal except the easterly one will be devoted to passengers going through over the Brooklyn elevated lines. The ticket agents at these stairways will sell only a single five-cent ticket, which will be deposited in the canceling boxes before entering trains, and passengers will no longer be subjected to the inconvenience of depositing a second ticket at the Brooklyn end of the bridge.

Holding Up a Railroad.

A press despatch from Indianapolis, Ind., of recent date says that in Montgomery County, Indiana, a farmer, Wesley Grantham, stopped all traffic on the Chicago & Southeastern Railroad by posting armed men at a point where the line crossed his premises. The farmer's grievance was that the railroad company had for seven years neglected to pay him for land it had taken. On Jan. 11 the Circuit Court of the county refused to enjoin Grantham, the judge saying, in effect, that the railroad had had seven years in which to make a settlement, and apparently holding that the road was negligent in not doing this. A considerable number of men from a neighboring town went out to assist Grantham, and carted off several wagon loads of rails. Two bridges of the railroad, one of them 60 ft. long, were blown up in the night.

Appointment of New East River Bridge Engineers.

The New East River Bridge Commission has made several appointments in its department. They are as follows: O. F. Nichols, principal Assistant Engineer; Western R. Bascome, Assistant Engineer; Alexander Johnson, Assistant Engineer; George D. Lewis, Assistant Engineer; Olaf M. Kelly, Assistant Engineer, and J. Alfred Tilley, Assistant Engineer.

A Crossing Subway at Harrisburg.

At the Union Station in Harrisburg, Pa., is a bad grade crossing, where Market street crosses the tracks of the Pennsylvania Railroad and the Philadelphia & Reading, as well as the Pennsylvania Canal, which runs parallel with these roads. A subway is now to be built at that point to carry the street under the tracks. This is to cost $75,000, to be paid for in equal proportions by the two railroad companies and the city of Harrisburg. The length of the subway will be about 230 ft., and the open approach will be about 350 ft. more. The clear height from the new grade of the sunken street will be 13 ft. 6 in., and there will be two sidewalks depressed to give a clear height of 8 ft. The walls will be of masonry lined with light colored brick, and the roof will be steel with trough and ballast floor. It is the purpose of the Harrisburg Traction Company to carry two electric railroad tracks through this subway. A new jackknife drawbridge will be built over the canal, but it is believed that the canal itself will soon be abandoned, as it carries nothing now but a small local traffic. It is considered likely that the Philadelphia & Reading will abandon its present passenger station, selling it to the Pennsylvania Railroad Company, and build a new station on the other side of the present canal. This change would permit the Pennsylvania to put down a number of new tracks now much needed.

The Improvement of English Railroads.

Another motive power which is advancing into prominence is that of compressed air, and this also seems likely to prove a revolutionizer in railway operation. In respect to railway signaling, we are undoubtedly on the threshold of a great change, and personally I expect as much from the indirect as from the direct results of a quicker and more efficient method of keeping traffic moving on the rails. If the railway industry in this country is not to lose its long-established character for profit-bearing, the trend of new endeavor must be in the direction, not so much of adding to the accommodation provided, but of making a better use of the costly works already laid down. "Spend more money on equipment—improved signaling, powerful locomotives, big cars and better brakes—and you will have less need to spend so much on track doublings and relief lines"—this, I think, may well be the railway manager's motto for 1901.—*Transport* (London).

Compressed Air Locomotives for Powder Magazines.

The first compressed air locomotive for Iona Island, N. Y., to haul ammunition cars for the United States Government, has been completed at the H. K. Porter Locomotive Works. The new engine, with the charging plant, has been shipped.

Improvements on Italian Railroads.

The General Inspector of the Italian railroads, to show the improvement made since 1885, reports that in that year continuous brakes had been applied to only 78 locomotives, 303 passenger, 51 baggage and 38 freight cars; in 1899, to 991 locomotives, 2,162 passenger, 489 baggage and 2,044 freight cars. In 1885 no train signals, between cars and locomotives, were in use; in 1899, 514. In 1885, there was not quite 435 miles of double track; in 1899, three times as much. There were in the earlier year no block signals; now the most crowded sections and stations are protected by such signals.

Condition of the Chinese Eastern.

The latest news of the damage done by the Boxers to the Chinese Eastern Railroad is that about 700 cars were burned or broken up, leaving about 900 uninjured. Of the 60 locomotives, 17 fell into the hands of the Boxers and got the worst of it, though some of them can be repaired. The other 43 are in good condition. On the 300 miles of road-bed from Port Arthur to Telin, about 180 miles has been badly damaged, so that it will cost some $3,000 a mile to make it good. Here all the bridges and stations were burned. The whole damage on the line is estimated at from $3,000,000 to $4,000,000. The damage can be made good, it is hoped,

The Railroads of Japan.

The Japanese railroad year ends with March. At its close in 1900 there were 3,633 miles completed in the country, of which 832 miles were State railroads. During the year 223 miles were added to the system, which is much less than in either of the two previous years, money being hard to get recently. The capital invested is about $125,000,000; the gross earnings last year, $19,100,000, nearly two-thirds from passenger traffic. The heaviest earnings per mile were $12,300, by a state railroad, the next being only $7,000, while the lowest were $2,860, $2,510 and $1,880. All are narrow-gage roads.

A Japanese Accident.

Japan reports a novelty in the way of railroad accidents—the burning of a locomotive while hauling a train. The locomotive burned petroleum, and the oil tank leaked. So much had leaked before it took fire that the engineman and fireman had to retreat before the mass of flame to the roof of the nearest car. Meanwhile the locomotive kept on over a considerable distance and past a station, till the oil was all burned, when it came to a halt without doing any further damage than frightening a trainload of passengers out of their wits and convincing the people on the line that of all foreign devils this was the most devilish.

The Highest Chimney.

The Silver Works Company, of Antwerp, Belgium, have just completed the construction of a chimney, 410 ft. high. The interior diameter at the base is 25 ft. and at the top 11 ft. The chimney is surmounted by a lightning conductor about 50 ft. high. This is said to be the highest chimney in the world.

Our Trade with Russia.

An effort is on foot to prevent the importation of beet root sugar from Russia by having the Secretary of the Treasury abrogate the clause under which this sugar is brought in under the "favored nation" rate. Manufacturers who have large interest in the Russian trade are alarmed lest Russia should retaliate if such action is taken. It is thought that it would result in discriminating duties that would prevent further exports of machinery from this country to Russia. Our exports to Russia amount in value to many times the value of the sugar imported, and undoubtedly that trade will soon be increased immensely if it is allowed to take its natural course.

A Governor and New Railroads.

Mr. Stuyvesant Fish, President of the Illinois Central, sent to the Governor of Mississippi a copy of the *Railroad Gazette* of Dec. 28 containing our report of railroads built in 1900. In sending this Mr. Fish wrote:

"As an evidence that the broad-minded utterances in your inaugural address of a year ago have borne fruit, and will bear more, permit me to bring to your attention the fact that, with the exception of Wyoming, West Virginia and your neighbor, Louisiana, Mississippi has shown in the calendar year now closing the largest ratio of increase in railroad mileage of any state.

"In congratulating you on the showing made, I have no hesitancy in expressing the belief that we have seen the last of legislation tending to repress the investment of capital in Mississippi, and that under your wise guidance, railroads and other monied corporations can count with confidence on the cordial co-operation and assistance of the state government in all its branches, in their efforts to develop the vast latent resources of the state.

"In closing, permit me to assure you of our sincere regard and best wishes to you and the good people of Mississippi for the coming year, and for all time."

Track Elevation in Newark, N. J.

Last week we reported that Mayor Seymour, of Newark, had signed the ordinance permitting the Central and Pennsylvania railroads to elevate their tracks through Newark. On the disposal of this ordinance, the Commissioners took up the matter regarding the elevation of the tracks of the Morris & Essex R. R. (Delaware, Lackawanna & Western). The plans submitted by the railroad, some time ago, provide for a re-location of the tracks and building a new passenger station.

The Wreck of the Maine.

The question of raising the wreck of the U. S. S. "Maine" is again under consideration, and on Feb. 1 bids will be opened at Havana by Lieut.-Commander Lucien Young, U. S. N., Captain of the Port, for raising the wreck of the "Maine" in that harbor, and also for raising the Spanish steamer Alfonso XII., sunk at the mouth of the harbor of Mariel.

A Naval Station for the South Atlantic Coast.

Last week the Board of Naval Officers appointed to report upon the relative merits of Port Royal and Charleston, S. C., as a suitable site for a naval station on the South Atlantic Coast, of which Board Rear Admiral Frederick Rodgers is President, reported in favor of Charleston over Port Royal, where the station is now located. An exhaustive review of the advantages and disadvantages of the two locations is given, including their accessibility from the sea, immunity from attack, railroad and steamship facilities, labor supply, etc. The site recommended is on the west bank of Cooper River about six miles above the Custom House. When Port Royal was selected the great schemes for harbor improvements in the South had not been carried out, and Port Royal was the only Southern harbor suitable for large ships.

Missouri, Kansas & Texas Bridges for 1901.

A contract for 959,000 lbs. of steel for the superstructure of eight bridges, to be built during the year 1901 for the Missouri, Kansas & Texas, was recently let to the Wisconsin Bridge & Iron Co. These new bridges will mostly replace light iron bridges. The bridges are mostly located in Central Texas, and when finished the use of heavy power will be extended one division further south, over the Waco Division, which extends from Hillsboro to Smithville, 157 miles. The increasing traffic and opening of the San Antonio extension renders this renewal of bridges necessary. The grades will also be revised over most of these bridges. All the foundations will be built by the railroad company's forces. These new bridges are as follows:

List of New Bridges Required for 1901.

Span length.	Approx. weight, lbs.	Name of stream crossed.	Time of delivery.	Remarks.
100 ft.	148,000	Miller's Creek	April 15	Half through-riveted.
100 ft.	148,000	San Gabriel Riv.	April 15	Half through-riveted.
84.6 ft.	126,000	San Gabriel Riv.	April 15	Through plate girder.
60 ft.	77,000	Waco Creek	June 1	Through plate girder, 1 panel skew.
84.6 ft.	95,000	Deer Creek	June 1	Deck plate girder.
84.6 ft.	95,000	Big Elm Creek	June 1	Deck plate girder.
84.6 ft.	95,000	Little Elm Creek	June 1	Deck plate girder.
124.6 ft.	175,000	Mill Creek	July 15	Through riveted.
Total...	959,000 lbs.			

Another Fire in New York Harbor.

A fire in the early morning of Jan. 9, at Erie Basin, New York Harbor, caused a loss of about $500,000. Several vessels were more or less damaged, namely, the excursion steamship "Idlewild"; the British steamship "St. Dustan," owned by the Anchor Line; the steamer "Coya," owned by Wm. R. Grace & Co., and several lighters. The freight pier of the Beard Erie Basin Stores was also considerably damaged.

Inspection of Floating Dry Dock at Havana.

The naval board ordered to inspect the large floating dry dock at Havana sailed from New York for Havana on Jan. 5. The dock will be inspected with a view to its purchase by our government, and the inspection will also cover the naval station and all naval property at Havana. The members of the board are Capt. S. C. Lemley, Commander John D. Ford, Lieut. Commander Lucien Young, Naval Constructor George H. Rock and Civil Engineer A. C. Cunningham.

The Hardie Locomotive.

The Hardie compressed air locomotive, designed for elevated road or suburban service, has been undergoing some changes at the locomotive works here [Rome] during the past two weeks, with a view to increasing its capacity, and incorporating the most recent improvements. This work has been practically completed, and Tuesday a trial was had on the branch of the Central tracks opposite the works. The test was made under the direction of General Manager Stagg, of the company's works. The engine worked admirably, and was easily controlled, as to starting, speed and stopping. The maximum speed it has made is 35 miles an hour. It is constructed to carry 2,500 pounds of initial air pressure in its storage tubes, which pressure is mechanically reduced to 150 pounds to the square inch of working pressure. With a train of four to five filled passenger cars the machine is good for a run of 25 miles on one charge of air.—*Rome Sentinel.*

British Railroading.

The discussions of the merits and shortcomings of British railroads are still very lively in England and in the *Times* at least are sometimes important. A recent letter is from Mr. J. Burton-Alexander, and from that we make a few extracts:

As one who has had very great courtesy shown him on the railways of Canada, Australia, the States and France, may I venture to reply to Mr. Gibb's clever letter in your issue of November 9?

Mr. Gibb [General Manager, North Eastern] challenges your leading article's accuracy with regard to the general up-to-dateness of the English systems, more especially with regard to equipment, track and speed. Can he seriously maintain that the out-of-date hand-worked block system is not a relic of almost prehistoric times compared with the automatic signals in use in the States or even the electric-pneumatic signals which only require the operator to exert strength enough to press a button and leave air and electricity to do the rest?

Also with regard to goods equipment, the new pressed-steel cars for 100,000 lbs. weigh 30,000 lbs. to 35,000 lbs., while in England the baby wagon called a truck weighs 11,000 lbs. to carry 18,000 lbs., besides the unnecessary room wasted in buffers, with short cars, which might be saved.

In the States Congress passed a law compelling a quick-acting automatic brake and automatic couplings to be fitted to every car—passenger and goods. On their expresses they use the new form of brake, the "high-speed" brake, with which our vacuum brake is in no way comparable.

As to punctuality, generally avoided in England like the plague, I live on one of our lines, the Midland, and often go to our local station, 52 miles from London. Till three weeks ago punctuality was almost unknown, and the only question of interest to the passenger was the degree of lateness. Since then the passenger trains are not quite so bad, but the goods trains get through when they can. I fancy the consignees of perishable goods may want explanation of this.

Mr. Gibb rather prides himself upon the punctuality of his trains. He is right. His line is an oasis in the desert. But in Canada, France or the States the oasis would be fine and large, and few lines, if any would not have to be included. Does an English manager know for certain, barring accidents, the trains will arrive in the terminals on time? Only twice in the States and Canada during about 15,000 miles of travel—north, south and west—was I late.

A Steel Bridge Over the Oxus.

The Trans-Caspian Railroad, now called the Asiatic Midland, formerly crossed the Amu-Darya (the ancient Oxus) by a long wooden bridge, which was burned three years ago. The Russians have now nearly completed as a substitute a modern steel bridge of 24 spans, which will be just about a mile long. The scene of its construction to a passenger from the Caspian, who has passed through long stretches of desert to reach it, is an astounding one; the modern engineering construction, with the various appliances for its erection, and the electric lights, and movement and bustle of masses of men working in combination are almost by the side of a landscape and a life much like that of the time of Abraham. The valley of the Oxus itself, where irrigated, is very productive, and further east on the railroad, the streams which come down from the mountain before they lose themselves in the desert fertilize a country which pro-

duces abundantly not only grain and fruits of the temperate zone, but quantities of rice and cotton, production of which is increasing rapidly and affording a growing traffic for the railroad, built originally for military purposes and until very recently operated by the Russian War Department. The revolution caused by modern transportation appliances in one of the oldest countries, with a civilization which has been almost stationary for two thousand years, is much more striking than the development of a previously unoccupied wilderness, like Siberia or our own Far West of 50 years ago.

The Uganda Railroad.

The Uganda Railroad, which is to extend across British East Africa from the Indian Ocean at Mombasa, in about 6 deg. north latitude, northwestward 582 miles to the northern part of Lake Victoria Nyanza, and which is by far the most extensive undertaking of the kind in any part of Africa unsettled by whites, has already the track down for a distance of 440 miles, to the eastern border of the great East African depression. Here from a summit 7,697 ft. above sea level, the surface plunges down 1,670 ft., and within a very short distance rises again to 8,240 ft. above the sea, to fall again 4,486 ft. to the lake at the terminus. All these changes of elevation are to come on the 142 miles of road yet to be built.

Electric Communication on the Hawaiian Islands.

Mr. John C. Carrington, of Omaha, Neb., is promoting a new telephone system for Honolulu. He requires 250 subscribers, of whom 150 have been secured, with a prospect of obtaining the other 100. The automatic call board system is the one proposed. The company intends to connect Hilo and Honolulu with a cable requiring some 200 miles of cable, if an all-water route is followed; otherwise about 175 miles, with wires strung on the islands of Nolokai and Maui.

The Wireless Telegraph Company is making efforts to instal a system of telegraphing between the islands which it hopes to have in order Jan. 15. After considerable trouble, an expert was brought from England, who located the difficulty in the ground wire which was buried in dry earth. When the wire was removed to damper soil the trouble disappeared. Apparently the only cause of delay is the building of a telephone line to the wireless stations on each island. Some of the stations are three and four miles away from telephonic connections, being so located on account of the mountainous conditions of the islands.

Sunday Rest.

The Hungarian authorities have recently given instructions for the better execution of a law intended to secure Sunday rest to railroad employees, which was passed as long ago as 1891. By these instructions, on Sundays the only freight that will be received for shipment during the whole business day is corpses. Until noon express goods, beer and poultry will be received, and ice only till 10 o'clock. Deliveries will be made of corpses, living animals and explosives all day; express goods and beer till noon, and ice till 10 a. m.

Parcels Post in Germany.

The German Post-office Department is the chief carrier of what we would call express packages of moderate size—11 lbs. or less. Naturally, there is a vast amount of this traffic about Christmas. There is so much that the department puts on special "parcel trains" on certain routes. This year three such trains were to run daily between Berlin and Konigsberg, two between Berlin and Breslau, two from Berlin to Konigsberg, one to Cologne and one to Hamburg. As a rule these trains consist of 15 cars. They were to begin running Dec. 19.

A Red Cross Tax on Tickets.

The Russian authorities have imposed a stamp tax on passenger tickets for the benefit of the Society of the Red Cross, which cares for the sick and wounded. The tax amounts to about 2½ cents, and is required on all first and second-class tickets which cost two rubles ($1.03) or more, and third-class tickets which cost eight rubles ($4.12) or more, which latter are not more than 2 per cent. of the whole number of third-class tickets. No fourth-class tickets pay this tax. It is estimated that the Red Cross will get about $125,000 a year from this tax.

General Utility of the Pop-Valve.

The Locomotive says "a few days ago one of the Hartford Company's inspectors found a pop-valve that was filled almost solid full of hickory nuts by some industrious squirrel. It is not likely that these nuts would have prevented the valve from blowing, and yet, when considered from an engineering standpoint, they could not be regarded as an improvement to it. A pop-valve loaded with hickory nuts and provided with a straight, horizontal escape pipe, would, when it blew, be likely to make the neighbors think the Spanish war was still with us."

Pull the Cord and Get a Shock.

A press despatch says: "A Geneva correspondent credits an engineer named Planta with the invention of a brake that will stop a train running twenty-five miles an hour within eight yards and one running fifty miles an hour within twenty yards. Passengers can apply the brake by pulling an alarm cord. The shock is said to be less than that caused by existing brakes. The correspondent adds that the Government will adopt the invention on trains throughout Switzerland." We have been unable to learn where the passengers stop.

Graphite.

So far as yet known Ceylon holds the largest and richest deposits of graphite, and the world is indebted to Ceylon for its largest supply. The next best source of supply are the Ticonderoga mines of the Joseph Dixon Crucible Company. In a paper read before the Ceylon branch of the Royal Asiatic Society we are told "that the export of Ceylon graphite must have commenced between 1820 and 1830, as Mr. Joseph Dixon, the founder of the American Crucible Company, obtained a shipment of Ceylon plumbago in 1829." Mr. Dixon, in the year 182?, made crucibles by using the plumbago found in the state of New Hampshire. He afterward saw specimens of graphite that had been brought from Ceylon as curiosities by captains in the East India trade; and, finding them so much better than the New Hampshire plumbago, he procured a shipment, which was the first importation of Ceylon graphite into the United States.

Nickel Industries of Canada.

Nickel was first found to exist in paying quantities in Canada in the year 1887, the principal deposits being in the Sudbury district. Since then the industry has developed until it is claimed that Canada furnishes over 40 per cent. of the nickel of the world. The district in which the ore is found is near Sudbury, in Ontario, and is about 70 miles long by 40 miles wide. It is estimated that there is enough nickel now located to supply the world for the next hundred years at the present rate of consumption. There are now less than a dozen mines equipped with plants, with an output of about 700 tons of ore per day. The deepest mine goes down about 1,000 ft., and others from 50 to 400 ft. The principal companies operating and preparing to operate in this district on a large scale are the Canadian Copper Company, of Cleveland, Ohio, the Mond Nickel Company, of London, England, and the Lake Superior Power Company, of Sault Ste. Marie.

Greek Imports of Railroad Material.

The Greek Government has just published official returns for 1898, from which we gather that in that year there were imported into Greece 514,232 francs worth of rails, of which 480,087 francs worth came from Belgium, and the rest from Great Britain, France and Austria. In 1897 the imports of rails amounted only to 96,437 francs. Car springs were imported to the value of 20,221 francs, chiefly from Germany, France, Belgium and Great Britain. Railroad bridge material imports amounted in value to 271,280 francs, to which Great Britain contributed 187,048 francs worth, and Germany 59,229. One single passenger car, valued at 10,000 francs, came from England, on which 1,000 francs duty had to be paid. Freight cars were imported to the value of 24,600 francs, almost entirely from Belgium. Bolts, screws, nuts and nails imported in 1898 were valued at 376,233 francs. The total imports of iron, steel and manufactures thereof amounted in value to 6,294,000 francs, or about $1,240,000.

Rolling Stock for the Vladikavkaz Railroad.

At a recent meeting of this company, whose headquarters are at St. Petersburg, the administration was authorized to issue a new loan to the maximum amount of $15,340,000, to be used for the extension of the system and for the purchase of additional rolling stock. At present, the length of the railroad amounts to 1,524 miles.

LOCOMOTIVE BUILDING.

The Cuba Company has ordered four engines from the International Power Co.

The International & Great Northern is in the market for 10 heavy freight engines.

The Jacksonville & Southwestern is having one engine built by the Baldwin Locomotive Works.

The Chicago, St. Paul, Minneapolis & Omaha is having four engines built by the Schenectady Locomotive Works.

The Pittsburgh, Bessemer & Lake Erie is having one engine built by the Baldwin Locomotive Works.

The Choctaw, Oklahoma & Gulf order with the Baldwin Locomotive Works, referred to last week, calls for 22 instead of 20 engines, and includes passenger, switching, 10-wheel and consolidation engines, two of which will be compounds. All are for June and July delivery.

The Wabash has ordered 50 locomotives from the Richmond Locomotive & Machine Works, 34 of which will be two-cylinder compound mogul, six 10-wheel passenger, six Atlantic type passenger and four switching engines. The moguls will have 19-in. x 28-in. cylinders; 56-in. driving wheels and will weigh in working order about 130,000 lbs., with about 110,000 lbs. on the driving wheels; the boilers will be of radial stay type, 60 in. in diam., with tubes 2 in. in diam. and 11 ft. 4⅝ in. long; the fireboxes will measure 108 in. long and 42⅝ in. wide; the tenders will have a capacity for 5,000 gals. of water. The 10-wheel passenger engines will have 19-in. x 28-in. cylinders; 66-in. driving wheels; radial stay boilers 62 in. in diam.; fire-boxes, 120 in. long and 42⅝ in. wide, and will weigh in working order about 147,000 lbs., with about 112,000 lbs. on the driving wheels. The tender capacity will be 5,000 gals. of water. The switching engines will have 18-in. x 24-in. cylinders; 44-in. driving wheels; radial stay boilers, 60 in. in diam., with tubes 2 in. in diam. and 10 ft. 4½ in. long; fire-boxes, 84 in. long and 33⅜ in. wide, and will weigh about 102,000 lbs. The tender capacity will be 3,000 gals. of water.

The Erie has ordered 25 simple consolidation engines, with Wootten boilers, from the Baldwin Locomotive Works. They are for delivery in June and July, will weigh 194,000 lbs., with 172,000 lbs. on the driving wheels, and have 21-in. x 30-in. cylinders; 62-in. driving wheels; 200 lbs. working steam pressure; and steel frame tenders, with a capacity for 7,500 gals. of water and 15 tons of coal. The specifications call for Ashcroft gages; Consolidated safety valves; one Metropolitan and one Monitor injector (both on the right side) on each engine; Westinghouse brakes; Kewanee brake-beams; cast tender wheels to weigh 800 lbs. each; Leach sanding devices; Carbon fire-box and boiler steel; National (Erie standard) flues; cast-iron shaking grates; Taylor iron staybolts; and cast-steel frames and driving wheel centers made by the American Steel Casting Co.

CAR BUILDING.

The Great Northern is reported in the market for passenger cars.

The Green Bay & Western will soon be in the market for about 100 box cars.

The Missouri, Kansas & Texas will soon be in the market for about 2,000 cars.

The Cudahy Packing Co., of Omaha, Neb., is in the market for 200 refrigerator cars.

The Pere Marquette has ordered from the Rodger Ballast Car. Co. 60 Rodger standard 40-ton ballast cars.

The Iowa Central has ordered 50 cars from the American Car & Foundry Company. They will be built at Chicago.

The Goodwin Car Co. has ordered 100 of its Class "G" 80,000 lbs. capacity steel cars from the American Steel Foundry Co.

The White & Black River Valley (Choctaw, Oklahoma & Gulf) has ordered 12 freight cars from the Laconia Car Company.

The International & Great Northern has ordered 1,000 freight cars, part box and part coal, from the American Car & Foundry Co.

The Coahuila & Pacific has ordered 25 freight cars from the American Car & Foundry Company. They will be built at St. Charles.

The Silverton Northern has ordered 20 freight cars from the American Car & Foundry Company. They will be built at St. Louis.

The Delaware, Lackawanna & Western has ordered 25 freight cars from the American Car & Foundry Company. They will be built at Berwick.

The Chicago, Milwaukee & St. Paul has ordered 20 passenger cars from the Barney & Smith Car Co. and two parlor cars from the Jackson & Sharp Co.

The Illinois Central is not now in the market for freight cars, as reported by a contemporary, but it is possible that some cars will be ordered later in the season.

The Chicago, Burlington & Quincy has ordered 15 coaches and five chair cars from the Pullman Co. They will measure 60 ft. long and have four-wheel trucks.

The Pittsburgh Coal Co. has ordered 750 gondola cars, of 80,000 lbs. capacity, and 250 double hopper coal cars, of 100,000 lbs. capacity, from the Pressed Steel Car Co.

The Canada Atlantic is assembling material for building 65 85,000-lbs. capacity gondola cars with full chutes. The company has built at its shops 750 cars at the rate of 24 box cars of 70,000 lbs. capacity a week.

The State Railroads of Chili have ordered 400 freight cars from the American Car & Fdy. Co. These are probably included in the 600 cars for export referred to last week, in connection with the American Car & Fdy. Co.

The Choctaw, Oklahoma & Gulf has ordered 400 box cars from the Mt. Vernon Car Mfg. Co., 300 box cars from the Southern Car & Foundry Co., and 100 box cars from the Georgia Car & Mfg. Co. They will all be of 60,000 lbs. capacity, 34 ft. long, 9 ft. wide, for June and July delivery. The specifications include Simplex bolsters.

The Atchison, Topeka & Santa Fe has ordered from the Illinois Car & Equipment Co. 800 box cars in addition to those recently ordered. It is probable that the road will also buy 1,000 coal cars. The 500 box cars ordered from the Mt. Vernon Car. Mfg. Co. and a like number of the same kind ordered from the Illinois Car & Equipment Co., and referred to last week, will measure 37 ft. 3¾ in. long, 8 ft. 11 in. wide and 7 ft. ¾ in. high. The specifications include Westinghouse brakes, Chicago grain doors and McCord journal boxes.

BRIDGE BUILDING.

ALASKA.—Major Ruhlin, in charge of the Quartermaster's Office, U. S. A., in Seattle, Wash., has received an order from Capt. Abercrombie, at Port Valdez, Alaska, for 1,000 ft. of ¼-in. steel cable and other material for a suspension bridge across the Lowe River between Valdez and the army post at Swanport.

ALLENTOWN, PA.—Bids are reported being received for the 1,750-ft. steel bridge proposed over Little Lehigh River, by the Allentown & South Allentown Bridge Co. It will have 2,200 ft. of approach and cost about $200,000. R. S. Rathbun is Engineer. (Dec. 14, 1900, p. 832.)

APPLETON, WIS.—Bids are wanted, on Jan. 23, according to report, for the piers and abutments for the South Division street bridge; also for placing the superstructure of the old Lake street drawbridge on the new piers, etc., at South Division street. David Hammel, Mayor. C. H. Gillett, City Surveyor.

The Mayor and the Government Engineer are reported considering plans for a projected bridge.

ASHLAND, NEB.—The Chicago, Burlington & Quincy will build a 154-ft. steel bridge over Salt Creek, one mile from here.

BEANDETTE, MINN.—MacKenzie, Mann & Co., Toronto, Ont., will build a steel bridge 1,080 ft. long over Rainy River.

BRIDGEPORT, CONN.—A bridge is contemplated over Pequannock River from Arctic to Grand street.

BRUNSWICK, GA.—The Brunswick & Birmingham, a new railroad, will need two steel bridges, one 180 ft., the other 240 ft. E. C. Machen, 277 Broadway, New York, is interested.

CANAJOHARIE, N. Y.—The old wooden covered bridge over the Mohawk River was burned on Jan. 10. The officials of this town and of Palatine are considering plans for a modern steel structure.

CEDAR RAPIDS, IOWA.—The State Railroad Commissioners are considering modified plans for the A avenue viaduct over the railroad tracks on Fourth street. The work will probably be done this winter and cost $35,000.

CHICAGO, ILL.—Bids are wanted, on Jan. 25, by L. E. McGann, Commissioner of Public Works, for a highway bridge over the North Branch of Chicago River at Clybourn place. It is to be a steel structure, 216 ft. long, and will cost about $72,000. John Ericson, City Engineer.

It is stated that bids will be advertised for, in February, to be opened by the Drainage Board for the Canal street bridge over the Chicago River.

City Engineer John Ericson has notified the Commissioner of Public Works that the bridges over the Chicago River at North avenue, West Division street, 22d street and Archer avenue are in a dangerous condition, and unless repairs are made at once the structures will be put out of service.

COLUMBUS, OHIO.—County Surveyor Maetzel is making plans for 58 small bridges and culverts to be built in the spring.

The Columbus & Buckeye Lake Traction Co. has had the time extended for building its proposed bridge over the Big Walnut Creek.

COOKSHIRE, QUE.—E. S. Baker, Secretary-Treasurer of the corporation, wants tenders for bridges.

COVINGTON, KY.—The Cincinnati, Newport & Covington (electric) Ry. will build a steel bridge, for which plans are reported ordered made.

FORT WAYNE, IND.—A contract will soon be let by the Fort Wayne & Southwestern Traction Co. for a 170-ft. bridge over the St. Mary's River. Address Townsend, Reed & Co.

FRENCH INDO CHINA.—Bids will be received, until May 9, by the Director of Public Works for Cochin, China, at Saigon, for a bridge over the Arroyo Chinais. Particulars may be had from the offices of the Inspector-General of Colonies, at the Ministry of the Colonies, Paris, France.

HELENA, MONT.—Proposals will be received by Chas. J. Clark, County Clerk, until Feb. 1, for building a steel bridge across Prickley Pear Creek, about three miles from Helena.

HUNTSVILLE, MO.—Bids are wanted, Jan. 23, by N. A.

Matlock, County Surveyor, for an iron highway bridge over Silver Creek, to be 60-ft. span and 60-ft. approach.

Later a contract will be let for a bridge of the same size on Sweet Spring Highway.

INDIANAPOLIS, IND.—Two bridges, at $100,000 each, according to report, are proposed by the Board of Public Works, over White River, one at W. Washington street, the other at Olive street, each to be six spans. A bond issue will probably be made.

The Wabash Bridge & Iron Works has a contract for two suspension bridges over White River in Riverside Park. One is 380 ft. and the other 320 ft. long.

NEOSHO, MO.—The Newton County Court will receive bids, on Feb. 1, and let a contract on the 5th for an iron bridge 130 ft. long over Shoal Creek. It is not decided if it will be one or two spans. R. Fred Jones, County Surveyor.

NEW YORK, N. Y.—A bill to abolish grade crossings on the New York Central Railroad at Spuyten Duyvil was introduced in the Assembly on Jan. 11.

OTTAWA, ONT.—The Canada Atlantic will build a bridge over the Ottawa River on a proposed extension.

PITTSBURGH, PA.—The contract for doing the substructure work on the new Fort Wayne bridge over the Allegheny River is let to Drake & Stratton, at about $200,000. The new bridge will have two decks, one for passenger traffic and the other for freight business. The contract includes the building of four large piers, three in water and one on land.

PRESCOTT, ARIZ.—The Missouri Valley Bridge & Iron Works will build for the Santa Fe, Prescott & Phoenix Ry., a steel viaduct 645 ft. long over Hell Canon. It will be 165 ft. high and is on the proposed cut-off, 22 miles south of Ashfork. The contract price is $65,000.

ST. JOHN, N. B.—A. George Blair, Jr., will apply to Parliament for permission for the Harbor Bridge & Railway Co. to build a railroad and general traffic bridge across the harbor.

ST. JOSEPH, MICH.—A bill was introduced in the House of Representatives on Jan. 8 and referred to the Committee on Interstate and Foreign Commerce, authorizing the Indiana, Illinois & Iowa R. R. to build a bridge across the St. Joseph River at or near St. Joseph, Mich.

SPRAGUE'S FALLS, ME.—The Washington County R. R. has let a contract to the American Bridge Co. for the steel bridge over St. Croix River at this place, four miles from Baring, Me.

TACOMA, WASH.—A contract to build 16 bridges on the extension of the Bellingham Bay & British Columbia R. R. is let to Rydstrom & Georig, of Tacoma.

TEMPLETON, MASS.—The Templeton Street Ry. will build a subway beneath the tracks of the Boston & Albany.

TOLEDO, OHIO.—Bids are reported asked for the Lafayette street bridge. W. F. Brown, City Civil Engineer.

TORONTO, ONT.—It is proposed to rebuild the Scottish Ontario & Manitoba Land Co.'s bridge in Rosedale to permit of the crossing of trolley cars.

TRENTON, N. J.—The Pennsylvania will build a new bridge over the canal at State street. Congress has passed the bill for a new bridge over the Delaware River at this place.

WASHINGTON, D. C.—The repair work on pier four of the Aqueduct bridge across the Potomac River at Washington, which has been proceeding for over two years, will be completed by the end of this month. The trusses have been lowered to their places on the pier and the false work and cofferdam are now being removed. The work has cost nearly $100,000. A bill has recently been introduced in the House and Senate authorizing the Commissioners of the District of Columbia to rebuild and repair the superstructure of the bridge sufficiently to allow them to run a single-track electric railroad over it, to be used by all the suburban electric roads which now reach the Virginia end of the bridge.

Other Structures.

BAYONNE, N. J.—Work has been begun on the new boiler works of the Babcock & Wilcox Co., at Bayonne, where the company recently bought 30 acres of land, with a frontage of 650 ft. on the Kill von Kull. The new building will have a floor area of 40,000 sq. ft.

BRAZIL.—The Government of Brazil will advertise shortly for bids for the dredging of the port of Para and for building some piers, according to a despatch from United States Consul-General Seeger at Rio de Janeiro.

CLEVELAND, OHIO.—A company is reported organized by H. A. Garfield to build a shipbuilding plant on the shore of Lake Erie, about 30 miles east of Cleveland.

GALVESTON, TEX.—It is reported that the Southern Pacific will build a grain elevator on pier A.

GUTHRIE, OKLA. T.—A union station will be built at this place for the Santa Fe, the Rock Island and the Oklahoma & Eastern. It is to be a two-story structure of pressed brick and cut stone.

HARRISBURG, PA.—Plans for remodeling the union station in Harrisburg are being made, according to report, by the Pennsylvania R. R. The entire station will be raised four feet.

MONTREAL, QUE.—The Montreal Rolling Mills will build a steel and pipe mill at Cape Breton.

NEWPORT, R. I.—The New York, New Haven & Hartford is reported receiving bids for marine repair shops at Newport. Bids are to be opened on Jan. 23.

NEW YORK, N. Y.—The Armory Board will open bids, on Jan. 23, at 11:30 a. m., in the Mayor's office, for building an armory building for the Second Battalion of Naval Militia, N. G., N. Y. The new armory will be on First avenue, between 43rd and 44th streets, Brooklyn, and will cost about $60,000.

PATERSON, N. J.—We are informed that the Passaic Rolling Mill Co. contemplates adding several new open-hearth steel furnaces, besides an extensive electric power plant.

PHILADELPHIA, PA.—The Camden & Suburban Ry. Co. will build an electric power station at Moorestown.

SAULT STE. MARIE, ONT.—Louis Boyer, Solicitor of Montreal, Que., is applying to the Dominion Parliament for the incorporation of the Clergue Iron, Nickel & Steel Co., of Canada, to make iron, steel and nickel and railroad material. A plant is projected at Sault Ste. Marie; also at or near the city of Quebec.

SCHENECTADY, N. Y.—A contract is reported let to John McDermott, to build the new blacksmith shop for the Schenectady Locomotive Works. The building will be 400 x 125 ft. and will be situated across the canal from the works.

WASHINGTON, D. C.—Plans for a new building to be built as a memorial to the late Gardiner G. Hubbard, by his heirs, for the use of the National Geographic Society, have recently been considered by a committee consisting of Mr. Charles J. Bell, representing the Hubbard heirs; Messrs. S. H. Kauffmann, H. F. Blount and Bernard R. Green, representing the Society, and Mr. W. M. Poindexter, architect; and the design of Messrs. Hornblower & Marshall, architects, of Washington, was selected. It is understood that contracts will be made and the work begun on the building at once.

Another building for the use of the nine scientific societies of the District is also being considered and a lot 57 x 116 ft. has been bought on 15th street, between L and M streets N. W., on which it is proposed to place a building to cost about $50,000. The plan is to have a building with a large auditorium, smaller halls, committee rooms, etc., suitable for the use of the scientific societies of Washington, which are, beside the National Geographic Society, the Anthropological, Biological, Chemical, Antomological, Geological, Historical, Medical and Philosophical. The building proposed would also be used as headquarters by the National Academy of Sciences which holds its annual meetings in Washington.

WELLAND, ONT.—The Canadian Steel Co., which has been referred to as a member of the new English-American-Canadian iron and steel consolidation, is being promoted by E. M. Butz, of Pittsburgh, Pa. The company owns about 5,000 acres of land on the Welland Canal in the town of Welland, Ont. The plan is to have three blast furnaces and a steel plant of 2,000 tons daily capacity.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

Illinois Society of Engineers and Surveyors.

The Sixteenth Annual Meeting of this Society will be held at Bloomington, Ill., Jan. 23 to 25, inclusive. The programme includes a long list of reports and papers.

New York Railroad Club.

A regular meeting of the Club was held Thursday evening, Jan. 17, the paper of the evening being "A New Method of Rating and Loading Engines in Freight Service," by Mr. Thomas Tait, Manager Canadian Pacific Railway. Extracts from this paper appear elsewhere in this issue.

The Engineers' Club of Philadelphia.

The Twenty-second Annual Meeting of the Club will be held on Saturday, Jan. 19, 1901, at 8 o'clock p. m. The paper will be, "Nineteenth-Century Engineering; Its Evolution and Something of Its Beginnings in America," by Prof. Edgar Marburg.

At the meeting of Jan. 5, Mr. Charles S. Gowen gave an informal lecture upon the New Croton Dam, New York, illustrated with lantern reproductions of drawings and views of the work. He described in considerable detail the character of the location of the new dam, and the engineering features of most interest in its erection. The subject was discussed by Messrs. L. Y. Schermerhorn, John Birkinbine, John W. Hill, George S. Webster and others.

Franklin Institute.

The bulletin for January-February, 1901, follows:

Jan. 16.—Annual meeting of the Institute. The Bardwell votometer. Mr. Fillmore, New York. Applications of Photography to Police and Sanitary Administration. Dr. Henry Leffmann.

Jan. 17.—Stated meeting of the Electrical Section. Election of officers for the current year.

Jan. 23.—Annual meeting of the Physical Section. Address of the retiring President, Dr. A. E. Kennelly.

Jan. 24.—Annual meeting of the Chemical Section. Address of the retiring President, Dr. W. J. Williams. Chemical lecture experiments.

Feb. 6.—Stated meeting of the Committee on Science and the Arts.

Feb. 7.—Stated meeting of the Section of Photography and Microscopy.

Feb. 13.—Stated meeting of the Mining and Metallurgical Section.

Feb. 14.—Stated meeting of the Mechanical and Engineering Section.

The winter course of Popular Scientific Lectures at the hall of the Young Men's Christian Association begins on Friday evening, Jan. 11, and will continue on each following Friday evening until completed.

Western Society of Engineers.

The annual meeting and dinner of the Western Society of Engineers was held at the Grand Pacific Hotel, Chicago, Tuesday evening, Jan. 8th. At this meeting the result of the election of officers for 1901 was announced. Those elected were: Octave Chanute, President; Wm. H. Finley, First Vice-President; B. E. Grant, Second Vice-President; Ralph Modjeski, Treasurer; J. J. Reynolds, Trustee. The two trustees whose terms had not expired are: B. J. Arnold and August Ziesing. After the banquet a short address was made by the retiring President, Mr. A. V. Powell, who presented the new President, Mr. Chanute. With a few appropriate remarks, Mr. Chanute accepted the office as President, after which Mr. Robt. W. Hunt, as toast-master, announced

Improvement of the Chicago River

as the subject to be discussed by the speakers selected for the occasion. He first introduced Mr. L. E. Cooley, formerly Chief Engineer of the Chicago Sanitary District, and one of the original promoters of the Chicago Drainage Canal, now so nearly completed. Mr. Cooley called attention to the enormous traffic on the Chicago River, and stated that upward of eight million tons of grain and flour had been delivered to the elevators along the river during the year just closed, which was within one million tons of the entire receipts of the port of Liverpool. Since the opening of the Drainage Canal, the trouble that has confronted the trustees and all interested in the commerce of the Chicago harbor, is the fact that in order to pass the volume of water through the Drainage Canal, required by the State law creating the Sanitary District, a swifter current must result than is consistent with the safe and economical handling of vessels. On the other hand, if only such volume of water is allowed to pass through the Chicago river as is consistent with the best interests of navigation, then the dilution of the sewage will be less than that required by law. Thus the Sanitary District Trustees find that with the present restricted channel of the Chicago River they cannot comply with the State law without exceeding the limit of current set by the United States Government. Mr. Cooley also referred to the complications which necessarily arose, due to the fact that the Chicago River was subject to the control of: First, the United States Government; second, the State of Illinois; third, the Chicago Sanitary District; and fourth, the City of Chicago. There is certain to be more or less friction between these several interests, and any plan for the improvement of the Chicago River must be so carefully devised as not to antagonize any one or more of these interests.

The commercial aspect of the situation regarding the necessary improvements of the Chicago River was made the subject of an address by Mr. P. B. Weare, President of the Weare Commission Company. Mr. Weare pictured a very serious condition of affairs along the River at the present time. The expense of handling cargoes in the Chicago River now is seriously working against the commerce of the City, and it is already commercially impossible to handle modern vessels of large tonnage profitably in the Chicago Harbor, owing to the obstructions of center piers and tunnels and the excessive current resulting from the flow through the Drainage Canal. Up to the present time, the greatest flow that has been maintained through the Chicago River during the season of navigation has been 220,000 cu. ft. per minute, while according to the law not less than 340,000 cu. ft. a minute is required. He stated that vessel owners were making a discrimination of 1-16 to ⅛-cent per bushel in freight rates against the port of Chicago, in favor of other ports along the lake, such as South Chicago, Waukegan, Milwaukee, Ashland, Washburn, Green Bay and Manitowoc. He added that Manitowoc alone has taken away from Chicago upward of two million bushels of grain, owing to the difficulties of navigating the Chicago River. He felt that unless something was done immediately to relieve the situation, Chicago would soon become a mere way-station, so far as the shipment of grain is concerned, instead of being a great terminal and transfer port, as it has been and should be.

Mr. Weare was followed by Judge O. R. Carter, who considered that the former speaker's view was too pessimistic. He said he was reminded of Mark Twain's reply to a cablegram sent him while he was abroad. It had been rumored that he had died, and one of his friends cabled for confirmation or denial of the rumor. Mark Twain's reply was: "Reports about my death greatly exaggerated." Judge Carter felt certain that the improvement of the Chicago River would be pushed ahead with the same vigor that had characterized the construction of the Drainage Canal and deplored the discouraged view taken of the situation by some of those whose personal interests were being most seriously affected at this time.

Dr. Reynolds, the Health Commissioner of Chicago, spoke of the great benefit which the opening of the Drainage Canal had been to the health of the city. He considered that it was no exaggeration to state that had the citizens not been most persistently warned through the daily press of the unhealthy conditions of the water, prior to the opening of the Drainage Canal, and so induced either to boil water for domestic purposes, or otherwise purify it, there would be to-day fifty thousand people less in Chicago than there are. The opening of the Drainage Canal had removed the most dangerous elements of contamination of the Chicago water supply.

Mr. Joseph Braden, one of the Trustees of the Sanitary District, stated that in his opinion it would require eleven million dollars to give immediate relief to the shipping interests of Chicago. Among the works which he considered of prime importance would be the construction of controlling works at the juncture of the River with the Drainage Canal. These works would be able to control the current in the River, as it is effected by the rise and fall in the lake, which is frequently from twelve to eighteen inches in a very few hours.

Mr. Wm. Boldenweck, former President of the Board of Trustees of the Sanitary District, spoke in favor of immediate steps being taken to secure the legislation looking to the improvement of the Chicago River. He took occasion to criticise the stand taken by Mayor Harrison of Chicago on the question of lowering the tunnels now used by the street railway companies, believing that the question should be immediately considered, instead of being made secondary to the renewal of the street railway franchises. The street railway companies have expressed a willingness at the present time to lower these tunnels, providing they can get satisfactory renewals of their several franchises, which will expire in the next four or five years, while Mayor Harrison contends that the lowering of the tunnels should not be used as a club with which the railway companies may hope to secure valuable franchises for the use of the streets on practically their own terms.

The last speaker of the evening was Captain J. G. Keith, one of the largest vessel owners of Chicago, who summed up his statement of the case by saying that the vessel owners had but little at stake, as they could move their property to other more profitable harbors, while to owners of elevators and the merchants of Chicago the withdrawal of a large percentage of the commerce of the port of Chicago was a most serious matter.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—At a meeting of the Indianapolis Division of the Central Association of Railroad Officers held Jan. 7, Mr. C. A. Paquette, heretofore Vice-President, was elected President.

—The members of the Railroad and Warehouse Commission of Minnesota are now elected by the people; and the board, as now constituted, consists of Ira B. Mills, Joseph G. Miller and Charles F. Staples. Judge Mills, who has before been a member of the Commission, is the Chairman. The terms of Messrs. Mills and Miller expire at the end of 1904, while that of Mr. Staples expires at the end of 1902.

—Captain Peter C. Asserson, Civil Engineer U. S. Navy, has been placed on the retired list of the navy on account of age. He was appointed from Virginia and entered the navy as a civil engineer on March 6, 1874. It is understood that under a provision of the navy personnel bill permitting the assignment of retired officers to duty, Capt. Asserson will continue on his present duty at the Brooklyn Navy Yard.

—Mr. F. C. Fox on Jan. 1 became Superintendent of the newly extended Western Division of the Atchison, Topeka & Santa Fe at La Junta, Colo. He was born Oct. 9, 1863, and served as a telegraph operator for four years from 1880. Then for five years he was Freight

and Ticket Agent, and until 1893, Chief Train Despatcher. Then he became Trainmaster on the Atchison, Topeka & Santa Fe, in which position he continued until the time of his recent appointment on the Western Division.

—Mr. A. C. Hone, as recently noted, has been appointed Superintendent of the Evansville & Terre Haute at Evansville, Ind. Mr. Hone was born June 17, 1874. Leaving the Rensselaer Polytechnic School at Troy in 1895, he began work the same year as an apprentice in the machine shops of the Lidgerwood Manufacturing Company of Brooklyn. He held the position of Assistant Superintendent of these shops when he left there in October, 1898, to take service with his present company as Assistant Engineer in the Maintenance of Way Department. Ten months later he was appointed Superintendent of Motive Power, and held that position until Jan. 1 last, when he became Superintendent.

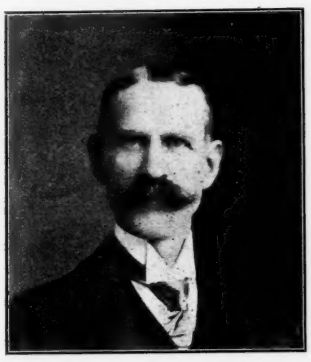
—Mr. Percy R. Todd, who has just been elected Second Vice-President of the New York, New Haven & Hartford, was born at Toronto, Ont., Dec. 4, 1859. He was educated at the Collegiate Institute at Ottawa, and entered the service of the St. Lawrence & Ottawa (Canadian Pacific) as clerk and telegraph operator. Afterward he was connected with the Ogdensburg & Lake Champlain for seven years, then for three years was in Chicago with the National Despatch Line, and in 1886 became General Freight and Passenger Agent of the Canada Atlantic. In December, 1889, he became General Freight Agent, and three years later Traffic Manager of the West Shore, which position he has held up to the present time.

—Mr. George Sargeant, Jr., the new Engineer of Maintenance of Way of the Erie at Jersey City, N. J., was born in 1863. He was graduated as a mining engineer from the University of Pennsylvania in 1884, and entered service the same year with the coal companies of the Pennsylvania Railroad. Three years later he became Engineer and Supervisor of the railroad proper, continuing in that office until 1890, when he was made Assistant Engineer and Division Engineer on the Philadelphia & Reading. He entered the service of the Erie, in 1893, as Assistant Engineer, and continued in that office until 1897, when he became Roadmaster of the Susquehanna Division, the position he occupied at the time of his recent change.

—Mr. W. B. McCaleb has recently had a third division added to his jurisdiction on the Pennsylvania. Mr. McCaleb entered the service of the Pennsylvania in 1880 at the age of 18, as a chainman on the corps building branches in the Connellsville region. He has remained continuously with the company since that time, serving for three years in the Engineering Department, when he became Supervisor of the Pittsburgh Division. He was subsequently advanced through various grades of Supervisor and Assistant Engineer at Allegheny and Harrisburg, to the position of Superintendent of the Bedford Division in 1895. A year later he was appointed Superintendent of the Sunbury and Shamokin Divisions at Sunbury. To these has been added the Lewiston Division. His headquarters continue at Sunbury.

—Commodore Alexander Henderson, Chief Engineer, U. S. Navy (retired), died at his home in Yonkers, N. Y., on Jan. 12, aged 69 years. Commodore Henderson was born in Washington, D. C., July 12, 1832, and entered the Navy as a Third Assistant Engineer Feb. 26, 1851. In 1852-1855 he was with the fleet which opened up Japan to intercourse with other powers, and he was in active service until and during the Civil War, after which he was Fleet Engineer of the Asiatic and European stations. From 1882 to 1889 Mr. Henderson was a member of the Naval Advisory Board, which did the first work toward the "New Navy," and while on that duty designed and superintended the building of the machinery of the "Chicago," "Boston" and "Atlanta." In July, 1894, Mr. Henderson retired with the rank of Commodore, and lived for some time in New York, where he engaged in several business enterprises. During the Spanish War he was again in active service as Fleet Engineer of the auxiliary navy.

—Mr. George L. Peck has been appointed General Superintendent of the Pennsylvania Lines, Southwest System, succeeding Mr. John F. Miller, and leaves the office of Superintendent of the Pittsburgh Division, which he has held since Jan. 15, 1896. Mr. Peck was born in Sandusky, Ohio, in July, 1858, and entered the service of the Pennsylvania as a messenger boy at Toledo. He has worked up through the traditional channel as operator, train despatcher, Trainmaster and Division Superintendent. He was recently offered the position of General Manager or General Superintendent of the Chicago & Alton, and the story is that he was also offered some important position on the Union Pacific.



—Dr. William Pole died in London Dec. 30 at the age of 86. One of the English engineering newspapers says that "to the majority of our readers his name will be best known as the Honorary Secretary of the Institution of Civil Engineers, a post of great honor in the engineering profession." This journal does not mention the fact that Dr. Pole ever wrote a book on whist. Another English engineering journal says that "his treatise on whist is better known than his scientific writings." The latter statement is probably true, so far at least as American engineers are concerned, and yet Dr. Pole was a distinguished engineer, besides being a man of remarkable talents in many directions. He had served as Professor of Civil Engineering in Elphinstone College in Bombay; as Professor of Civil Engineering at University College, London; as lecturer in the Royal Engineering School at Chatham; as a member of several Royal commissions on railroads, water supply, the pollution of the Thames and on iron armor. He was for 12 years Consulting Engineer for the Imperial Japanese Railways. Dr. Pole became a member of the Institution of Civil Engineers when that society was only 22 years old, and was a member for more than 60 years, and he did a great deal to build up the Institution. He was the author of a standard treatise on the Cornish pumping engine and translated from the German Dr. Alban's treatise on the high pressure engine. He was a brilliant amateur musician, being a performer, a composer and a student, and received the degree of Doctor of Music at the University of Oxford. His little treatise on whist has now passed out of the fashion, having been superseded by several more elaborate studies, but in that small volume Dr. Pole laid down the fundamental principles on which the science of this noble game is based.

ELECTIONS AND APPOINTMENTS.

Atlanta & West Point.—G. F. Huggans has been appointed Consulting Engineer at Montgomery, Ala. The positions of Superintendent, heretofore held by Mr. Huggans, and of Assistant Superintendent, have been abolished.

Baltimore & Ohio.—J. H. Glover, heretofore Division Superintendent at Chicago Junction, Ohio, has been appointed Superintendent of the Eastern District, Pittsburgh Division, succeeding J. S. Norris.

Canadian Pacific.—A. A. Goodchild, heretofore Assistant Auditor of Disbursements, has been appointed Auditor of Statistics. James Bonner has been appointed Assistant Auditor of Freight and Telegraph Receipts.

Chicago & Northwestern.—W. D. Walden, Superintendent of Bridges and Buildings, at Clinton, Iowa, has resigned.

Chicago, Milwaukee & St. Paul.—H. G. Haugan has been appointed Comptroller.

Fort Wayne & Southwestern Traction.—The officers of this company, referred to in the Construction column, are: President, W. S. Reed; Secretary, George Townsend; Treasurer, Fred G. Morhouse; Chief Engineer, Wm. M. Moran. The central office is Fort Wayne, Ind.

Great Northern.—F. G. Williamson, heretofore Acting Division Superintendent at Larimore, N. Dak., has been appointed Division Superintendent.

Kinzua & Tiona.—The officers of this company are: President, G. W. Campbell; General Manager, F. B. Barnard; General Superintendent and Secretary, E. W. Campbell; Superintendent, F. R. Campbell, and Auditor, C. M. Stedwell.

Lehigh Valley.—At a meeting, held Jan. 15, the following new Directors were elected: E. B. Thomas (President of the Erie), George F. Baker, J. R. Maxwell (President of the Central of New Jersey), George F. Baer, R. C. Lippincott and Charles Steele, succeeding E. P. Wilbur, Charles Hartshorne, J. B. Garrett, E. Delano, R. M. Gallaway and the late C. H. Coster. (See R. R. News column, Jan. 11, p. 34.) J. A. Droege has been appointed Superintendent of the Pennsylvania and New York Division, succeeding O. O. Esser, resigned on account of continued illness. J. B. Garrett, Vice-President, has resigned.

Long Island.—After Jan. 15, 1901, the passenger and freight departments of the Traffic Department will be managed by separate officers. H. M. Smith has been appointed General Passenger Agent, in charge of passenger traffic, tickets and advertising, and W. J. Rose becomes General Freight Agent, in charge of freight traffic. The position of Traffic Manager is abolished.

Missouri, Kansas & Texas.—W. B. Groseclose, heretofore Assistant General Freight Agent, has been appointed General Freight Agent, succeeding A. T. Drew, deceased.

New York Central & Hudson River.—Chas. E. Webster has been appointed Division Engineer of the Beech Creek Extension, with headquarters at Clearfield, Pa. (See R. R. Construction column, Dec. 28, 1900, p. 868.)

New York, New Haven & Hartford.—Percy R. Todd, heretofore Traffic Manager of the West Shore, has been elected Second Vice-President of the N. Y., N. H. & H., to have charge of the traffic department, and will assume his new duties Feb. 1.

Ohio Central Lines.—H. C. Ferris, heretofore Division Superintendent, has been appointed Assistant Chief Engineer at Columbus, Ohio, in charge of Maintenance of Way and Bridges and Structures.

Oregon Railroad & Navigation.—W. H. Hurlburt, General Passenger Agent at Portland, Ore., has resigned.

Pennsylvania Company.—S. W. Miller has been appointed Master Mechanic of the Southwest System, with headquarters at Indianapolis, Ind., succeeding Wm. Swanston, resigned.

Seaboard Air Line.—The duties of Vice-President and General Manager will, until further notice, be discharged by V. E. McBee, General Superintendent, at Portsmouth, Va., to whom the heads of all departments (except the Legal, Accounting and Treasury) will report. The General Counsel, Comptroller and Treasurer will report direct to the President, at Richmond, Va.

Southern.—W. H. Wells has been appointed Engineer of Construction, at Washington, D. C., reporting to the First Vice-President.

Union Depot of Kansas City.—E. J. Sanford has been elected President and Superintendent, and C. C. Ripley Secretary and Treasurer.

Union Pacific.—Francis B. Choate has been appointed General Agent of the Freight and Passenger Departments, with headquarters at Pittsburgh, Pa., effective Jan. 10.

Western New York & Pennsylvania.—On Jan. 14, W. H. Barnes was elected President, J. M. Harding Secretary, and R. W. Smith Treasurer of this company, which was recently leased to the Pennsylvania. (See R. R. News column, Sept. 21, p. 628.)

Wisconsin Central.—George T. Jarvis having resigned as General Manager, communications and reports relating to the Maintenance, Transportation, Motive Power and Car Department should be addressed to the General Superintendent, effective Jan. 15.

F. J. Erfert has been appointed Assistant General Freight Agent, succeeding J. S. Talbot.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—The San Francisco & San Joaquin Valley has asked a franchise for 12 tracks in San Francisco, from its water front property across Bryant street to the ferry slips.

BALTIMORE & OHIO.—Surveys are reported in progress for a branch from Mostollar, Pa., to run northwest up Beaver Dam Creek and Lafferty's Run, via Stanton's Mill to the Jenner coal field.

BLUE RIDGE & ATLANTIC.—This company has been organized in Georgia to build a railroad, to be practically an extension of the Tallulah Falls, from Tallulah Falls to Franklin, 140 miles. Officers of the Tallulah Falls are interested.

BOCA & LOYALTON.—A contract has been signed between the Loyalton Lumber Co., which owns this proposed line, and the Sierra Valleys Co., whereby the lumber company agrees to complete its line from Boca, Cal., north about 25 miles to Loyalton by May 1, 1901. The Sierra Valleys agrees to complete its connecting narrow gage line from a point 12 miles west from Plumas Junction to Loyalton. After the completion of the two lines the section of the Sierra Valleys line from Plumas Valley west 12 miles, is to be discontinued. (Oct. 5, 1900, p. 661.)

BRIGHTON, WARKWORTH & HAVELOCK ELECTRIC.—An officer writes that nothing definite has been done towards organizing this company to build an electric line from Brighton Harbor, Ont., on the Grand Trunk, to run northwest about 25 miles via Warkworth to Havelock, on the Canadian Pacific. The projectors are negotiating for an old charter, and if successful, will enlist capital and go forward with the project. The line will be designed chiefly for heavy freight traffic, using large electric locomotives. (Dec. 14, 1900, p. 834.) R. N. Barbour, of Toledo, Ohio, is interested. (Official.)

BRITISH COLUMBIA ROADS.—Wendel P. Jones, of Woodstock, N. B., is applying to the Dominion Parliament to build a railroad from a point on the White Pass & Yukon across the Lewis branch of the Yukon River to the Hootalinqua River, thence to the Big Salmon River, also to extend the line north to the Stewart River, and to build branches in the Hootalinqua and Big Salmon valleys.

Notice of application to the Dominion Parliament at its next session is given for an act to build a railroad from Michel in the East Kootenay District, B. C., via Michel Creek and along Elk and Upper Kootenay Rivers south to the International boundary; also from Michel Creek north along the Elk River to a point on the main line of the Canadian Pacific Ry.; also a branch east by the North Kootenay Pass to Alberta, to connect with the Crows Nest Pass Ry. Gemmill & May, of Ottawa, applicants.

BRUNSWICK & BIRMINGHAM.—Grading was begun, Dec. 31, on this line from Brunswick, Ga., in a direct line to Birmingham, Ala. There will be two steel bridges required of 180 ft. and 240 ft. respectively. No contracts are let as yet. E. C. Machen, of 277 Broadway, New York, is the eastern representative. (Nov. 23, 1900, p. 783.)

CHATEAUGAY.—An officer writes that no final action has been taken as to laying the third rail for standard gaging to Dannemora, N. Y. (Jan. 4, p. 16.)

CHATTANOOGA & LOOKOUT MOUNTAIN.—This company was incorporated in Tennessee, Jan. 7, with a capital stock of $250,000, to build or acquire a steam or electric line from the city of Chattanooga to the top of Lookout Mountain, 10 miles. A road under this title is already operative between those two points. The incorporators are: S. W. Devine, R. W. King, Winifred A. Cary, Robert Pritchard, J. B. Frazier and George W. Davenport.

CHICAGO, BURLINGTON & QUINCY.—This company is making preparations to still further extend its second track across Iowa. The double track was partially completed from Murray to Creston last year, and will be entirely completed this spring. From Creston west the company will continue the building this year. The old line between Creston and Villisca, Iowa, will be entirely abandoned in some places and new routes selected, which will tend to eliminate many curves. The company is paying a good price for the right of way, and thus hopes to avoid lawsuits. A heavy cut is to be made a few miles east of Villisca. A force of men is now at work clearing the new route of timber. (Construction Supplement, July 27, 1900.)

CHICAGO, MILWAUKEE & ST. PAUL.—The company has bought gravel land near Jefferson, Iowa, which it will use in ballasting the new track between Rockwell City and Storm Lake, and between Fonda and Spencer, Iowa.

The company intends to replace the 52-lb. rails between Clive and Panora, Iowa, with 70-lb. rails this summer.

CONNEAUT & EASTERN.—This company was incorporated in Ohio, Jan. 11, by the Carnegie Company, to build a connection at Conneaut, Ohio, from the property of the Conneaut Land Co., to the Lake Shore & Michigan Southern and the New York, Chicago & St. Louis.

DAVENPORT, ROCK ISLAND & NORTHWESTERN.—The company is reported to have taken options on $40,000 worth of property in Clinton, Iowa, for terminals. It is stated that building is to be begun in the spring on the proposed extension from Clinton, Iowa, to Dubuque, for which surveys were made last year. (Oct. 12, 1900, p. 680.)

DENVER & RIO GRANDE.—An officer writes that while no contracts have been let, the proposition is now being considered for a branch from Moffat, Colo., east 23 miles to Crestone, for which surveys were recently reported. (Jan. 4, p. 16.)

DETROIT & CHARLEVOIX.—This company was incorporated in Michigan, Jan. 4, with a capital stock of $25,000, to build a railroad from Frederick, on the Michigan Central, to run northwest about 50 miles to Charlevoix. David Ward, a lumberman of Detroit, is the chief owner.

DULUTH, MISSABE & NORTHERN.—Contracts are reported let for extending this line 12 miles along the Missabe Range in Minnesota.

FORT WAYNE & SOUTHWESTERN TRACTION.—Contracts are let to Townsend, Reed & Co., Chicago, for all labor, material and equipment (except rails) on this electric line from Fort Wayne, Ind., southwest about 25 miles via Aboite, Roanoke and Mahon to Huntington. (Dec. 28, 1900, p. 868.) The officers are given under Elections and Appointments. (Official.)

GRAND TRUNK.—With reference to work at Flint, Mich., an officer writes that in the reduction of grades and double tracking on the Grand Trunk Western between Port Huron, Mich., and Chicago, it was found advisable to make a deviation for about 10½ miles from the main line near Flint. This will reduce the eastbound grades from a maximum of 48 ft. per mile to 15 ft., and the west-bound grades from a maximum of 70 ft. to 20 ft., with considerable reduction of curvature and shortening the line about one-half mile. This cut-off, with considerable light work for the second track between Port

Huron and Durand, will probably be let early in the spring. H. A. Woods, of Detroit, Mich., is Engineer in Charge. (Nov. 30, 1900, p. 802.)

GREAT NORTHERN.—The company is reported preparing to build a new line of about 35 miles between Everett, Wash., and Seattle. The present line is expensive to operate on account of frequent landslides.

HAGERSTOWN ELECTRIC.—This company, which owns a line from Hagerstown, Md., south to Funkstown, has made surveys for an extension further south about 12 miles to Boonsboro, but no decision is reached as to building.

HAWKINSVILLE & FLORIDA SOUTHERN.—Building is reported begun on the extension from Pitts, Ga., north about 30 miles to Hawkinsville. (Oct. 26, 1900, p. 712.)

ILLINOIS CENTRAL.—An officer denies the report that surveys are in progress for an extension of the Yazoo Delta branch from Belzona, Miss., south to Yazoo City. (Jan. 4, p. 16.)

INTERCOLONIAL.—Hon. A. G. Blair, Minister of Railways in Canada, is reported as announcing the intention of the Government to spend $2,000,000 on improvements between Truro, Nova Scotia, and Sydney.

KANSAS CITY, WATKINS & GULF.—An officer writes that a survey has been made from Bon Air, La., near Iowa, to run east through Lakeside to Gueydan, Vermillion Parish. Nothing definite, however, is determined as to building. (Dec. 28, 1900, p. 868.)

LA CROSSE, BLACK RIVER FALLS & NEILLSVILLE.—Arrangements are under way, according to report, for building this line the coming season, from La Crosse, Wis., to run northeast about 75 miles up Black River, via Black River Falls to Neillsville. Locating surveys are reported made. Paul McHugh, of La Crosse, Wis., is interested.

LAKE SHORE & MICHIGAN SOUTHERN.—Surveys are reported in progress for a new line between Ashtabula, Ohio, and Youngstown, which will save about 10 miles in length and remove several heavy grades.

LITTLE ROCK SOUTHERN.—Surveys are reported in progress for this line from Little Rock, Ark., south 138 miles to the Louisiana State line and thence to Bastrop, on the New Orleans & Northwestern (which see below). A. L. Phillips, of Little Rock, is Engineer in charge. W. P. Witherop, of Titusville, Pa., is a director. (Jan. 11, p. 34.)

MARYLAND ROADS.—The Maryland Granite Co., of Savage, is obtaining right of way for a line from Savage north about two miles up the Little Patuxent River to Guilford.

MEXICAN CENTRAL.—An officer writes that no arrangements have been made for the reported extension from Aguascalientes, Mex., west to Guadalajara. (Dec. 28, 1900, p. 868.)

MISCELLANEOUS COMPANIES.—The Hamilton Railroad Right of Way Co., Hamilton, Tex., was incorporated in Texas, Jan. 5, with a capital stock of $10,000, to obtain rights of way for railroads to and from the town of Hamilton and neighboring towns. The incorporators are: J. L. Spurlin, George F. Perry, J. A. Eldsen, J. T. James, J. J. Durham, G. R. Freeman and J. E. Williams.

NEW JERSEY & STATEN ISLAND.—At a meeting of the directors, on Jan. 12, it was decided to increase the capital stock from the nominal figure of $5,000 to $10,000,000, and the President was authorized to do the necessary work preliminary to obtaining rights of way. The road is projected from the Kill von Kull bridge to Stapleton, S. I., and thence under the Narrows to Bay Ridge, and under Brooklyn to Thirty-ninth street. The franchise was granted several years ago to Erastus Wiman. Stephen M. Hoyle, of 189 Montague street, Brooklyn, is President. (Nov. 2, 1900, p. 732.)

NEW ORLEANS & NORTHEASTERN.—Surveys are reported in progress for an extension from Bastrop, La., north about 60 miles to Warren, Ark.

NEW YORK CENTRAL & HUDSON RIVER.—Another bill has been introduced in the New York Legislature for straightening the company's tracks between Kingsbridge and Spuyten Duyvil. The proposition is to exchange the present right of way for a new one along the Harlem Ship Canal. (Construction Supplement, July 27, 1900.)

NEW YORK, NEW HAVEN & HARTFORD.—The company is reported planning a connecting line from North Attleboro, Mass., to run northwest about eight miles to Pleasant View to connect with the Providence Division.

NORTHERN PACIFIC.—Detailed plans are reported completed preparatory to letting contracts for the proposed cut-off from Ellensburg, Wash., east 90 miles to Lind. Nov. 16, 1900, p. 764. An officer denies that there is any truth in the report that his company will build from Mabton, Wash., to run south to the foothills near Glade. (Jan. 4, p. 16.) Location was filed in Idaho, January 4, for an extension of the Clearwater Short Line, from Stites, Idaho, east via Three-mile Creek to Grangeville. The line was completed last year to Stites, 62.8 miles, from Potlatch Junction.

NORWALK, ASHLAND & SOUTHERN.—This company proposes to build a line from Norwalk, Ohio, south about 30 miles via New London and Savannah to Ashland. The central office is at Ashland. C. P. Wickham is President, and J. H. Beattie, Vice-President, both of New London.

ONTARIO, JAMES BAY & NELSON RIVER.—This company is seeking a charter from the Dominion Parliament to build a railroad from a point near North Bay between Lake Nipissing, on the north, and Lake Temiscamingue on the south, thence west across the Albany River north of the forks of the Kenogami River, and the Kapikotongiva River about 270 miles north of Lake Superior; thence crossing the Wasbiokiva River near Severn Lake, terminating at the Nelson River near Rose Island north of Lake Winnipeg, with a branch of 145 miles to Fort Albany. D. B. Maclennan, Ottawa, Solicitor for Applicants.

ONTARIO ROADS.—Messrs. Watson, Smoke & Smith, of Toronto, are making application to the Parliament of Canada for authority to build a railroad from Toronto to Georgian Bay; and to navigate the great inland lakes of Ontario, and the French River with steamers, barges, ferries and other vessels, and to build tramways, etc.; also for power to enter into running arrangements over any and all railroads within three miles of the line.

Capitalists of Ypsilanti, Mich., represented by Joseph Webb, propose to build an electric line from Windsor, Ont., to Chatham. Railroad committees of Chatham and Kent counties have passed resolutions promising all possible aid.

OHIO RIVER & LAKE ERIE.—In addition to surveys from Bergholz, Ohio, to Steubenville, of which three miles to Phillips is building, the company is surveying from Steubenville south via Goose Creek line to Miller's Station, and southeast via Wolf Creek line to Unionport. (Nov. 2, 1900, p. 732.) There is a possibility that an extension will be made of one of the four or five routes from Phillips to a connection with the Pittsburgh, Cincinnati, Chicago & St. Louis during the coming year. (Official.)

OREGON SHORT LINE.—An officer writes that, contrary to report, no contracts have been let for changing the Utah & Nevada line to standard gage. The company has this work under contemplation, but nothing definite is determined. Work may be started some time the coming spring. (Dec. 28, 1900, p. 868.)

PENNSYLVANIA.—The Chief Engineer has called for bids for work on the lines in Pennsylvania as follows: On the Philadelphia Division, change of line at three points between Florin and Rheems; on the Middle Division, additional tracks between Juniata bridge and Aqueduct Station; change of line and additional tracks in Lewiston Narrows; additional tracks between Mount Union and Mill Creek, and between Spruce Creek and Union furnace; on the Pennsylvania Division, four-track roadbed between Larimer and Stuart. This work includes 1,432,000 cu. yds. of masonry; 100,000 cu. yds. of embankment, and 25,000 cu. yds. of riprap. Bids must be received Jan. 28.

PHILIPPINE ROADS.—Capt. Chas. W. Meade, of the Thirty-sixth Infantry, U. S. V., has turned in his estimates and plans to the Civil Commission for the proposed extension of the Manila & Dagupan R. R., from Dagupan, on the Island of Luzon, to run northeast about 55 miles to Baguio, in the neighboring province of Benguit, and about 5,000 ft. above the sea. (Dec. 7, 1900, p. 818.)

The Philippine Company, of New York, with a capital of $1,000,000, has been formed to build 300 miles of railroad on the Island of Luzon. The intention, as reported, is to build from Dagupan to the southern end of the island, using the overhead trolley. Wm. H. Stayton, of 30 Broad street, New York, is counsel for the company.

PORT CLARENCE & COUNCIL CITY.—Royal Fraser, Engineer of this proposed line in Alaska, is reported in Tacoma, Wash., in the interest of the road which is to run from a point near Port Clarence in the Nome country, about 85 miles to Council City.

QUEBEC CENTRAL.—The company has given notice of an application to the Legislature of Quebec at its next session for authority to build a branch from Scott's Station to a point on the River St. Lawrence, at or near the southern extremity of the bridge now building over the River St. Lawrence by the Quebec Bridge Co., and thence to another point on the River St. Lawrence on the south bank, about five miles from the bridge.

QUEENSTON, NIAGARA & PORT DALHOUSIE.—This company has been incorporated with a capital of $40,000, to build an electric railroad from Queenston, on the Niagara River, opposite Lewiston, N. Y., to St. Catherines, by way of Port Dalhousie, on Lake Ontario.

RIO GRANDE, SANGRE DE CRISTO.—This company was incorporated in Colorado, Jan. 8, by officers of the Denver & Rio Grande, to build the proposed extension of that line from Moffat to Crestone. (See above.)

ST. LOUIS & NEW ORLEANS.—This company has been incorporated in Iowa, to build a railroad from East St. Louis, Ill., along the east side of the Mississippi, crossing the river near Ste. Genevieve, Mo., and thence through Arkansas and Louisiana along the river to New Orleans, with branches into the mining districts of northeastern Missouri and a loop from Arkansas City to a junction with the main line in southern Missouri. Among those interested is Joseph W. Wardle, of Cedar Rapids, Iowa.

SIERRA VALLEYS.—See Boca & Loyalton.

SOUTHERN INDIANA.—Surveys are reported in progress for a branch from a point near Indian Springs, Ind., to run southwest about 70 miles via West Baden to Louisville, Ky.

SOUTH HAVEN & PAW PAW LAKE.—This company has been incorporated in Michigan, with a capital stock of $150,000, to build the railroad recently noted under South Haven & Eastern, from Paw Paw Lake to Covert. The S. H. & E. does not control the new company, although it may operate the line. (S. H. & E., Jan. 11, p. 34.)

SUNSET.—Arrangements are reported being completed for beginning building early in the spring on this line from Bakersfield, Cal., southwest 39 miles via Gosford and Lakeside to Sunset. It is stated that when completed the road is to be operated by the Southern Pacific and the Atchison. C. M. Beale, of Bakersfield, is President, and J. L. Browne, Chief Engineer. (Aug. 3, 1900, p. 531.)

TECHE ELECTRIC.—Contracts will be let, in February, according to report, for this electric line from New Iberia, La., to run southeast about 45 miles along Bayou Teche through Jeanerette, Baldwin, Franklin and Pattersonville to Berwick City, there to connect with the ferry to Morgan City. F. F. Myles, of the Myles Salt Co., Ltd., New Orleans, is the principal promoter. (Nov. 30, 1900, p. 802.)

WASHINGTON ROADS.—A railroad is projected, according to report, from Spokane to Republic, with branches to the Methew and Okanomgam mining districts in Eastern Washington, including about 250 miles of road. H. W. Mangold, of Spokane, is interested.

WEST & ROSS.—This company was incorporated in Texas, Jan. 5, with a capital stock of $10,000, to build a railroad seven miles long in McLennan County, connecting the two towns named in the title.

WESTERLY & JEWETT CITY.—This company, which was incorporated in 1893, to build a steam line from Westerly, R. I., northwest about 20 miles, via Voluntown, Conn., to Jewett City, will make application to the Rhode Island Legislature for permission to extend its charter and to use electricity. (Construction Supplement, July 27, 1900.)

WINDSOR, ESSEX, LAKE ERIE & CHATHAM.—Messrs. Clarke, Cowan, Bartlett & Bartlett, solicitors, of Windsor, Ont., are applying to the Parliament of Canada, at its next session, to incorporate this company to build a steam or electric railroad from Windsor, Ont., County of Essex, via Leamington, to the city of Chatham, County of Kent, Ont.; also to build wharves, piers and docks and to operate ferries, steamers and other vessels.

WOODWORTH & LOUISIANA CENTRAL.—Building is reported begun on this proposed line from Woodworth, La., to Lamourie, six miles. R. A. Long, of Woodworth, President of the Long-Bell Lumber Co., of Kansas City, is interested. (Dec. 21, 1900, p. 852.)

GENERAL RAILROAD NEWS.

BOSTON & MAINE.—The 500 shares of Connecticut River stock, recently authorized, were sold at auction, on Jan. 2, at $275 per share, to Parkinson & Burr. (Dec. 7, 1900, p. 818.)

BURLINGTON, CEDAR RAPIDS & NORTHERN.—A semi-annual dividend of 2 per cent., and an additional extra dividend of 1 per cent. has been declared, payable Feb. 1. The extra dividend was 2 per cent. semi-annually, both last year and the year before.

CENTRAL OF NEW JERSEY.—J. Rogers Maxwell, President of the company, has sent the stockholders a notice to the effect that the controlling interest in the property has been sold, through Geo. F. Baker, to J. P. Morgan & Co., at $160 per share, payable at the purchasers' option within four months from Jan. 4, 1901, with interest from that date at 4 per cent., dividends accruing to the purchasers. Holders of minority stock are offered the same terms for half their holdings. (Jan. 11, p. 34.)

CENTRAL VERMONT.—The stockholders, on Jan. 7, authorized a mortgage supplemental to the mortgage of May 1, 1889, on the Rouse's Point Terminal, recently acquired. An agreement was executed in May, 1900, with the Ogdensburg & Lake Champlain and the Rutland-Canadian providing for joint ownership of the bridge across Lake Champlain, and for right of way through the O. & L. C. yard to Rouse's Point. The above mortgage covers these terminals.

CHICAGO, ROCK ISLAND & PACIFIC.—A deed was filed in Webster County, Iowa, last week, transferring the Gowrie & Northwestern to the Rock Island, the consideration being $1,479,215.58. The property sold extends from Gowrie, in Webster County, Iowa, through Calhoun, Pocahontas, Beuna Vista, Clay, O'Brien and Osceola counties to a junction with the Burlington, Cedar Rapids & Northern, at Sibley, Iowa, about 110 miles. The transfer is absolute and embraces all property and privileges which belonged to the G. & N. W.

CINCINNATI, JACKSON & MACKINAW.—The sale of securities, recently noted, which was to take place Dec. 19, has been postponed until Jan. 30. A temporary injunction restraining the sale was obtained by representatives of interests in the property. (Dec. 7, 1900, p. 818.)

COLUMBUS, WELLSTON & SOUTHERN.—The stockholders have authorized a bond issue of $2,000,000 to build the extensions of the road southeast to Wellston, Ohio, 17 miles, and northwest to Columbus, about 40 miles. (Construction Supplement, July 27, 1900.)

DELAWARE & HUDSON.—The directors, on Jan. 11, fixed the dividend rate for the year 1901 at 7 per cent., which is the same as the rate during the years 1889 to 1896, inclusive. Only 5 per cent. has been paid from 1897 to 1900.

HOCKING VALLEY.—The New York Stock Exchange has listed $162,000 additional first consolidated mortgage 100-year 4½ per cent. gold bonds of 1999, of which $101,000 is to be issued to retire car trust obligations of the Columbus, Hocking Valley & Toledo, and $61,000 for securities of the Ohio Land & Railway Co., and the Sunday Creek Coal Co. (Aug. 17, 1900, p. 560.)

INDIANA, ILLINOIS & IOWA.—Redmond, Kerr & Co., New York, and Lee, Higginson & Co., Boston, are offering $4,500,000 first mortgage 4s, recently bought by them, at 97½ and accrued interest. (Dec. 28, 1900, p. 868.)

INTERNATIONAL & GREAT NORTHERN.—The company has acquired the Houston, Oak Lawn & Magnolia Park Ry., about six miles long, extending from Fannin street, on Commerce avenue, Houston, Tex., to Magnolia Park, for $40,000.

LOUISVILLE & NASHVILLE.—A semi-annual dividend of 2½ per cent. has been declared, payable Feb. 11, which places the stock on a 5 per cent. basis, or an increase of 1 per cent. over the rate for 1900.

LOUISIANA SOUTHERN.—According to New Orleans press reports, the United Railway Trading Co., of England, has acquired the control of this railroad through acquiring the Kenilsworth Sugar Estates, Ltd., which own the railroad.

NEW YORK, ONTARIO & WESTERN.—Kuhn, Loeb & Co., New York, are offering 5 per cent. sinking fund gold first lien notes, of Dec. 1, 1900, and maturing in semi-annual instalments from 1901 to 1915, on a basis to yield 4½ per cent. per annum for the average running period. (Nov. 23, 1900, p. 784.)

NORTHERN PACIFIC.—J. P. Morgan & Co. ask holders of preferred stock trust certificates to present the same for exchange for stock before Feb. 15 next, after which date all such certificates must be presented for stamping before the dividend payable March 5 can be obtained. (Nov. 16, 1900, p. 764.)

PITTSBURGH, CINCINNATI, CHICAGO & ST. LOUIS.—At the annual meeting of the Little Miami, a leased line, to be held Jan. 29, the stockholders will vote as to an issue of $3,000,000 3½ per cent. bonds to replace advances by the lessee for betterments and improvements, and for redeeming 7 per cent. betterment bonds.

SHARON.—This company, which has absorbed the New Castle & Shenango Valley as a part of the Erie, has increased its capital stock from $500,000 to $800,000, of which $657,500 is outstanding. Street, Wykes & Co., of New York, are offering 3,376 shares of the stock at $70 for each $50 share, netting about 4.3 per cent. free of taxes. (Erie, Jan. 4, p. 16.)

UNION TERMINAL.—Negotiations for the use of the terminals of this company, at Sioux City, Iowa, by the Great Northern were completed in Philadelphia last week, and will probably go into effect Feb. 1.

WHEELING TRACTION.—A transfer was effected, on Jan. 1, to this company of the property of the Wheeling Ry., the Bellaire, Bridgeport & Martins Ferry, the Moundsville, Benwood & Wheeling, also the leasehold of the Citizens' Ry. The leasing company has filed a mortgage to the Western Reserve Trust Co., of Cleveland, Ohio, as trustee, to secure $2,500,000 30-year 5 per cent. bonds. (Dec. 14, 1900, p. 836.)